CONCEPTUAL PLAN

COMMERCIAL SATELLITE LAUNCHING FACILITY

Palima Point, Ka'ū, Hawaii

FINAL

ENVIRONMENTAL IMPACT STATEMENT

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THE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SECTION I: CUMULATIVE EFFECTS

The assessment of cumulative effects involves an analysis of the potential impacts of a project in combination with other projects planned for a community. The degree to which the proposed project will ultimately affect Ka`u depends on what other economic activities take place with the District. The direction and character of development of the area are controlled by land use plans which, in turn, are reviewed periodically for evaluation of past growth and future trends.

A. POPULATION, HOUSING AND AGRICULTURE

Population Growth. The analysis prepared by Decision Analysts Hawaii, Inc. (DAHI, DEIS Appendix IXA) indicates that the proposed launch facility will have a relatively modest impact on population growth since the affected communities have, and are expected to continue to have, a supply of potential workers which exceeds the number of available jobs, even if the proposed project proceeds. Current residents of the Ka`u area and residents of the County who will be attracted to Ka`u and surrounding communities for reasons unrelated to the launch facility are expected to fill most of the newly available non-specialized jobs.

Order-of-magnitude projections of population growth in Ka`u have been made conditioned primarily on the assumed development of the Spaceport facility and Sazale Black Sands Resort (formerly Punalu`u Resort), but not the Hawaiian Riviera Resort. Under these assumptions, the total population (residents and daily visitors) of Ka`u could increase by 2,380 and an additional 630 people with the Spaceport. Most of the population increase without the Spaceport would result from (a) new residents who are attracted to Ka`u because of cheap land for housing and who are independent of new jobs; and (b) resort development.

In 1990, the residents-plus-visitors population of Ka`u was about 4,440 people. By the year 2005, it is projected to reach about 7,450 people, or an increase of about 3,000 people over the 1990 population. Spaceport will contribute about 21 percent of this growth, with the remainder of the growth being due to new residents who are attracted to Ka`u because of the large supply of inexpensive lots for housing, and by the resort development at Punalu`u. The only other major development planned for the Ka`u area is the Hawaiian Riviera Resort in Kahuku. Development of this project does not appear to be likely to happen in the foreseeable future. If it is built it would have such a major impact on Ka`u that the growth-related impacts of the launch facility on population, jobs and housing would be even less than projected.

Housing Prices and Land Values The proposed project is expected to have little or no impact on existing housing prices, property values, or property taxes because the required 160 new homes can be supplied by a relatively modest housing project without creating an imbalance between supply and demand. Furthermore, 160 new homes represents only about 22 percent of the demand for new homes that is projected for the District by the year 2005. There could be some impacts on commercial and industrial land near the launch site because of increased demand for a limited resource. These properties could increase in value somewhat, thereby benefiting the landowners.

Most important, Ka`u has an enormous supply of unimproved housing lots which lack water and County-standard roads. The market for these unimproved lots and the homes on them is very active. Even if the population were to increase substantially, these unimproved lots will keep prices of homes on lots having full improvements relatively low and affordable: if homes with full improvements become expensive, then it becomes cheaper for a family to build on an unimproved lot and provide its own utilities (DAHI, DEIS Appendix XA).

Agriculture. Present planning policies indicate that the vast majority of the usable land in the District will continue to be used for agriculture. As sugar is phased out, new jobs will be supplied primarily from diversified agriculture and tourism, with modest growth in supporting commercial and governmental sectors. Construction of the launch facility will result in a resource loss of about 1,000 acres of agricultural land--a resource which will no longer be available for the potential growth of diversified agriculture. Because the limiting factor to the growth of diversified agriculture is not the land supply, but rather market demand for crops that can be grown profitably in Hawaii, the use of agricultural land for the launch facility will have little effect on local or Statewide agricultural production (Ibid.).

B. SHORELINES USES

Recreation and Subsistence Uses. The Spaceport project could affect recreational/subsistence activities on a broader scale through its influence on population growth in Ka`u. The impacts would be cumulative with those generated by population growth without the Spaceport. The cumulative effects described in this section are as likely to occur without the Spaceport project as with it. These impacts therefore are considered unavoidable.

Population growth always increases the demand for shoreline recreation and intensifies the use of existing resources. This will be especially true in Ka`u, where existing beach and beach park resources are very limited. By introducing tourists to the area, resort development will increase the demand for shoreline recreation. The most accessible and popular shoreline areas, especially Punalu`u Beach Park, will be subject to higher levels of use and competition for limited space. In addition, new types of uses which could conflict with existing activities could be established.

Activities which are more sensitive to crowding will tend to be displaced by activities which are less sensitive to crowding. As readily accessible areas become overcrowded, pressure increases to open up less accessible shoreline areas for use by the general public. These impacts will be magnified if there is any reduction in existing public access to Punalu`u beach and other popular shorelines. Such a reduction could occur as a result of resort development in Punalu`u. Although the developer plans to give the County of Hawaii the existing 6-acre Punalu`u Beach Park and to donate an additional 3 acres for park expansion, cars would no longer be permitted to drive to the shoreline, and there is a question whether overnight camping would be allowed to continue. Traditional family and community-oriented recreational activities could be displaced from Punalu`u Beach Park.

Very few shoreline areas along the windward coast of Ka`u are readily accessible to the general public. If the resident population increases substantially, a growing demand will arise to open up, for general public use, shoreline areas that are now accessible only by foot or jeep trails. Recreational use by the general public tends to concentrate wherever roads, parking areas, restrooms, drinking water and other support facilities are established. Improvements in access and support facilities damage the tranquility of wilderness recreation areas and displace low-density uses in favor of higher density uses. Natural resources in the vicinity of

facilities are subject to overuse, with significant and possibly irreversible effects.

Fishing. There will be effects on both nearshore and offshore fisheries whether or not the launch facility is constructed. The impacts will depend on whether or not plans to improve existing boat launching facilities are implemented. Improved shoreline access provided by the launch facility in combination with the development of additional visitor facilities at Punalu`u will result in a greater use of the shoreline area. This in turn, may affect existing recreational and subsistence fishing (Akala Products Inc., DEIS Appendices IXB and IXD).

Displaced users will try to relocate their activities to more isolated and secluded sites that are accessible only by 4-wheel-drive vehicles. As more sites are utilized and the general level of use rises in the region, there will be greater competition for limited resources. With greater fishing pressure, for example, the density of shoreline fish resources will be reduced and the more limited and fragile resources (e.g., `opihi) are likely to be exploited.

`Opihi is a staple in the diet of native Hawaiians and has been over-harvested everywhere in the main Hawaiian Islands where good shoreline access exists. Relatively high densities of `opihi are still found along the less accessible portions of the Spaceport shoreline, but this resource would be depleted rapidly with better access. If fishing increases significantly on a broad scale (the entire windward coast), fish availability and catch rates could be reduced to levels low enough to disrupt subsistence activities.

C. SIGNIFICANCE OF CUMULATIVE EFFECTS

Given the large supply of workers and housing, construction and operation of the launch facility could be expected to have only slight cumulative impacts on the growth of the region (DAHI, DEIS Appendix IXA). From a social-impact shoreline use perspective, the proposed project will induce fewer changes than major resort and associated housing developments (Matsuoka, DEIS Appendix IXC).

SECTION II: SUMMARY OF ADVERSE IMPACTS

A. NATURAL HAZARDS

1.0 Lava Flows

The launch pad area of the proposed facility is located within Lava Flow Hazard Zone 1, the most hazardous zone. The risk of inundation at the Palima Point site varies from high in the area downslope of the Kilauea southwest rift zone (the launch pad area) to moderate elsewhere. The only mitigating measure is to build lava diversion structures around the launch pads. If the lower Southwest Rift Zone of Kilauea should erupt, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities.

2.0 Earthquakes

Three primary earthquake hazards are of concern at the Palima Point site: (a) ground shaking; (b) ground failure; and (c) tsunami. The westernmost pad near Pu`u Pili is the most likely complex to be affected by tsunami run-up. The other launch pads and facilities are located at higher elevations and are therefore less vulnerable to tsunami run-up. Tsunami effects can be mitigated through structural design.

The rocket propellants stored at the proposed launch facility pose a hazard to the local population and environment in the event that an earthquake causes a failure of containment. Fires may spread through combustible vegetation and toxic or caustic gases may be generated as products of combustion. Explosions can cause large overpressures which may break windows and may scatter unburned propellant and debris over wide areas. Toxic or caustic gases can also be released into the atmosphere. On-site emergency response will serve to minimize some of the effects; design of the facilities to Uniform Building Code (UBC) 4 can also reduce the risk.

The worst case scenario would be the occurrence of a major earthquake when a fully-fueled launch vehicle is on the pad prior to lift-off. At this time the launch vehicle has minimal lateral support to withstand earthquake forces and would be exposed to puncture via toppling or slamming against adjacent support towers. If this happens the liquid propellants will most likely ignite and the rocket will be consumed. The effects would include toxic emissions from uncombusted hypergolic propellants, explosive overpressures and fire. The Delta II represents the most serious hazard because it contains the largest amounts of toxic/explosive propellants.

There is no mitigating measure for this impact; however, the probability that all the events leading to such a catastrophe would occur simultaneously is extremely small. On-site emergency response will reduce the adverse effects.

B. PROPELLANT TRANSPORT ACCIDENTS

1.0 Solid Propellants

If a solid propellant ignites and burns, the consequences can include the release of hot toxic gases, the generation of local fires, or the ignition of adjacent rocket motors. The resulting exhaust cloud may also be corrosive. A solid propellant produces large volumes of gas upon burning, which can lead to rupture and/or explosion. Explosions are usually pressure ruptures of containers, which may produce fragments.

The threat of a vehicle collision exists while the SRMs are being trucked to Palima Point. Whether or not a solid propellant will ignite or explode as the result of an impact depends on the plastic properties and shock wave propagation through the propellant. Direct exposure of the propellant to the flame temperature of a gasoline fire (>3000 F) for more than a few seconds would ignite the propellant since the flame temperature is well above the range of possible ignition temperatures. The probability of direct exposure of the propellant to a gasoline fire is considered low.

Although ignition of an SRM as a result of a transportation accident is considered to be unlikely, further analysis of actual hazards will be required when the actual project is defined.

2.0 Liquid Propellants

Accidental spills of toxic material could be caused by: a container being dropped from a crane; a drum falling from a truck; a valve being left open; or, hose failure. Human error, such as improper packing, loading and unloading, rather than poor container design, causes the majority of releases involving small packages (drums and cylinders). Although the probability of these accidents occurring is very low, there is no guarantee that an accident will not happen. Adverse impacts that could be generated by an accidental spill include:

Risks To Human Health. The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide. This emphasizes the need for proactive measures which will: (1) reduce the chances that an accident will occur, and (2) reduce the chances that an accident results in a release. It is also clearly demonstrated that an active emergency response capability to accompany transportation vehicles in order to contain, collect, and remove any spilled fuel is needed. Active response will reduce exposure and hence reduce risk significantly.

Risks to Sensitive Ecological Species. A worst case transportation spill scenario would be an accident occurring near Hawaii Volcanoes National Park. In this scenario, the highest concentrations are estimated to be closest to the highway. Within 20 m of the highway, estimated concentrations of hydrazine, UDMH and nitrogen tetroxide are above levels that have been found to produce adverse effects in faunal species. The concentrations of these compounds, however, decrease with distance from the spill site. Only N_2O_4/NO_2 is still unacceptably high at 1 km from the spill site.

While estimated concentrations of the three substances could potentially produce adverse effects to biota close to the highway, the three most sensitive habitats within the park are located farther away from Highway 11 and would not likely be affected by any spills.

3.0 Other Adverse Impacts from Transportation Accidents

If an accident involving a hazardous propellant occurs--even if there is no leak or spill--a safety zone would be established to protect the public from danger. The extent of this zone would vary by type of accident and release. The duration would also vary--certain highway segments could be closed for hours. This is significant because there are no alternate roads to Highway 11. This type of closure is expected to be very infrequent.

C. POTENTIAL ADVERSE IMPACTS FROM NORMAL LAUNCHES AND LAUNCH FAILURES

1.0 Impacts to People and Property

Risks To Human Health From Exposure To Toxic Emissions. Cancer risks and cancer burden were calculated using EPA methodology as described in "Risk Assessment Guidance for Superfund" (DEIS Appendix VIIIA). These results indicate that if an individual were to be in the general area of the spaceport (Pahala, Na`alehu, etc.) during successful launches or during several launch failures during their life, the risk of cancer would be negligible and no additional cancer would be expected in the population as a result of these activities. In the unlikely event that a launch failure was immediately followed by rain, the risk of cancer due to possible contamination of individual roof-catchment drinking water systems would also be negligible.

A hazard index approach was used for the evaluation of acute and chronic noncancer health effects due to exposure to launch emissions. The analysis results indicate that no adverse chronic or acute health effects would occur in either off-site populations or facility workers due to successful launches. Chronic (long-term) adverse health effects may occur in people living near the Spaceport if launch failures occur during certain unfavorable weather conditions and these failures involve the rupture and explosion of the Delta second-stage containing hydrazine. Acute (short-term) adverse health effects such as respiratory irritation might also occur during a launch failure. An off-site hazard index could be as high as 2.0 at Pahala if conflagration occurs during ascent at 10 seconds after lift-off. Because the chronic hazard index only slightly exceeds 1.0, however, there is only a small chance that chronic respiratory irritation would occur even in sensitive individuals in Pahala even after several failures. Both chronic and acute noncancer adverse health effects may also occur in on-site workers as a result of launch failures.

The airborne concentrations of rocket exhaust or unburned rocket fuel will be so low by the time they are transported under certain wind conditions to the Kona Coast that no measurable increase in respiratory irritation, cancer, or other adverse effects is expected in the population on the Kona side of the island due to successful launches or launch failures. This includes cumulative impacts added to the impacts of volcanic emissions.

It should be noted that standard launch safety procedures--which include analysis of real-time meteorological data--would preclude a launch under conditions that would cause adverse affects to off-site populations. The evaluations of effects on facility workers is also extremely conservative in that it is assumed that indoor workers are exposed to levels of contaminants present in outdoor air and that all workers within the population control zone are exposed to the maximum centerline ground level concentration that would occur within the PCZ. Additionally, the ability of a HAZMAT team to respond to a launch accident and reduce ground level concentrations is not considered.

Noise. Rocket launch noise in Pahala and Punalu`u may be sufficiently loud to mask

normal outdoor conversation for a half minute or so, but should not mask normal speech at more distant locations. Also, in the closer locations, the rocket noise may startle some persons or awaken them if they are sleeping. Community response analysis indicates that about 18 percent of the population of Pahala may be highly annoyed if all launches occur between 7 am and 10 pm; and about 39 percent will be annoyed if half the launches occur between 10 pm and 7 am. It is expected that community reaction will be minimal among those not already opposed to the launch facility and possibly substantial among those who are already opposed.

Explosive Overpressure. Based on calculations by ACTA Inc. (DEIS Appendix VIIF), an explosion on the launch pad would cause overpressures that could break windows at Punalu`u and Pahala. Further analysis is required to determine the extent of this damage. Close to the launch pad, the overpressure due to shock would exceed 1 psi. Although there is no conclusive evidence from actual studies, it is believed that this could potentially cause damage to nearby archaeological sites.

2.0 Impacts to Sensitive Ecological Species

Toxic Emissions. The ecological zone of concern (ECZ) is an area within 15 km (about 9 miles) of the launch site. It is highly unlikely that exposure to hydrogen chloride (HCl) from a normal launch would be detrimental to flora and fauna either within the ECZ or at distances farther downwind from the launch site. It is also reasonable to assume--at least for short-term exposures of approximately 1-hour duration--that exposures to concentrations of Al_2O_3 are unlikely to result in measurable adverse effects to biota. A conflagration on the launch pad is also unlikely to produce an adverse effects in biota (DEIS Appendix VIIIB).

HCl produced during conflagration events occurring 5 and 10 seconds after lift-off could potentially produce adverse effects in sensitive receptors within the ECZ. Aluminum oxide particles released during a conflagration event 10 seconds after lift-off could also adversely affect biota (Ibid.).

A liquid fuel deflagration could release carcinogenic substances such as hydrazine, UDMH, FDH and DMNA as well as N_2O_4/NO_2 which is noncarcinogenic. Exposure to expected concentrations of DMNA and hydrazine are unlikely to produce adverse effects. Exposures to the estimated concentrations for N_2O_4/NO_2 and UDMH/FDH have a higher probability of producing adverse effects in sensitive biotic receptors.

If the sensitive species within the ecological zone of concern have responses to N_2O_4/NO_2 similar to laboratory rodents, exposure to N_2O_4/NO_2 released in a deflagration could be detrimental to these species. One of the reported adverse effects of N_2O_4 is an increase in susceptibility to infection. If the affected receptors (especially the endangered bird species) respond in the same manner as rodents, this could have serious repercussions. Because the populations of many of the endangered bird species are declining due to introduced avian diseases (USFWS 1982), any decrease in their immunity could leave them more vulnerable to infection.

It is also unknown how simultaneous exposure to all of these carcinogens (as would be the case in a deflagration event) would effect these species. Multiple exposure could result in additive, synergistic or antagonistic toxicological effects.

Noise. The effect of low (but inaudible) frequency noise levels on reproductive behavior and development is uncertain. Generally, faunal species (particularly birds) would be most sensitive early in the breeding season during the nest site selection phase, when noise could cause the birds to abandon the site.

Debris Effects. Debris from an abort would result in the loss of flora in the launch area. It is not expected that this would result in a significant impact since vegetation on site consists primarily of introduced species. Fauna near the launch pad would also be affected, however, none of the debris footprints indicate an effect on the Kamehame Hill area, an area frequented by the Green and Hawksbill turtles. Fauna near the launch pad will be affected. There is a remote but unlikely possibility that debris resulting from destruction of a rocket launched from the southern pad could impact the turtle nesting area. If calculations of debris patterns show that the Kamehame Hill and beach area could be affected, mitigating measures will have to be developed in cooperation with the USFWS and the NMFS.

Explosive Overpressure. Close to the launch pad, the overpressure due to the shock would exceed 1 psi; this could have significant effects on nearby fauna, however, there is no clinical data supporting this.

D. ADVERSE IMPACTS FROM ON-SITE TOXIC SPILLS

1.0 Impacts to Human Populations

The individual cancer risk from just one on-site spill of hydrazine from a Delta second stage tank (615 gallons of Aerozine-50) is significant. The total community excess cancer burden per 70-year lifetime is 4.0 estimated excess cancers based on 1990 population estimates (DBED 1990) and 4.2 excess cancers based on 2000 population projections. Acute and chronic adverse health effects in the surrounding community will also occur from just one accidental spill of either 615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide during unfavorable wind conditions.

The need for both passive containment (dikes, berms, etc.) and more importantly, active containment which consists of active emergency response to contain, collect, and remove the spilled fuel are clearly indicated. Active response will reduce exposure and therefore reduce risk significantly (DEIS Appendix VIIIA).

2.0 Impacts on Ecosystems

Worst case spill scenarios produce high concentration gradients emanating from the source of the spill for many kilometers downwind. The predicted exposure point concentrations depend on the spill pool area and the weather at the time of the spill. Mitigation measures that include immediate containment can quickly reduce the estimated concentration of chemicals of concern (COCs) in the atmosphere. Both 1 mm- and 5-mm-deep spills release unacceptably high concentrations of COCs.

The highest concentrations of COCs are estimated within the PCZ. Despite the decrease in the concentration gradient, sensitive species outside the PCZ are still exposed to high exposure point concentrations. Within the zone, the probability exists that mobile receptors that utilize Palima Point (such as Hawaiian hoary bats, Hawaiian Hawk and sea turtles) could be exposed to concentrations of UDMH/FDH and N_2O_4/NO_2 that could cause adverse affects. Receptors that are distributed outside of the PCZ but within the 15 km zone of ecological concern could also be adversely affected by exposure to concentrations N_2O_4/NO_2 (DEIS Appendix VIIIB).

Mitigation measures that include immediate containment can quickly reduce the release of chemicals of concern (COCs) in the atmosphere. Active containment of spills reduces the

concentration of COCs (especially as a function of distance), thereby decreasing exposure of sensitive biotic receptors to potentially adverse effects.

3.0 Impacts on Groundwater

Drinking Water Supplies. An uncontrolled spill of either Aerozine-50 or RP-1 (kerosene) would result in the fuel percolating into the groundwater, spreading laterally toward the shore and discharging into the ocean. The contaminants would make the groundwater unsuitable for drinking water supplies without treatment until the contaminants had completely discharged into the ocean. Existing drinking water wells are landward of the proposed facility near the town of Pahala and along the highway to the south of the site. Spills at the Spaceport would not affect those areas.

Anchialine Ponds and Nearshore Waters. The quality of water in anchialine ponds near the shore, if any exist downgradient from a spill, could be affected because the ponds are actually exposures of groundwater, and contaminants in the groundwater surrounding the ponds would be present in similar concentrations in pond waters. The contaminants entering the ocean with migrating groundwater will be exposed to turbulent wave action and strong currents and would likely be difficult to detect.

The extent of impacts on marine biota are difficult to assess because of the unknown nature of the materials involved; their initial distribution on and in the sea; the dilution and advection rates; and the toxicity of these materials to organisms. In sea turtles, changes in water quality from the addition of anthropogenic chemicals may all adversely effect their reproductive success, however the concentrations at which these impacts may be manifested are unknown. The same statement may be made of all of the anchialine and marine organisms residing in the waters fronting the Palima Point Site.

E. IMPACTS ON THE MAUNA KEA OBSERVATORIES (MKO)

1.0 Lighting

Except during night launches and fueling operations, the impact of facility lighting on Mauna Kea will be minimal. All permanent outdoor lights at the launch facility will conform with the Hawaii County Lighting Ordinance. There will be no night launches unless they are mission related and required by orbital mechanics. UH IfA will be given at least one month's advance notice of any night launch. When a night launch is required, lights will be operated at the minimum levels necessary to safely carry out pre-flight and launch operations.

All temporary and permanent outdoor lights at the launch facility will conform with the Hawaii County Lighting Ordinance. The lighting inventory will be closely monitored to ensure that it does not differ significantly from that assumed in the EIS.

2.0 Radio Frequency Interference (RFI)

Radar transmitters associated with Spaceport operations have the potential to cause interference to both optical/infrared and radio telescopes because of their high power levels. The maximum potential for interference will occur if a radar antenna is aimed directly at MKO. Such interference would be reduced by using "sector blanking."

Even when the radar antenna main beam is aimed away from the telescopes, it is possible for energy emitted in the antenna "sidelobes" to cause interference. Sidelobe emission from a Palima radar would not interfere with the electronics of an optical/infrared telescope during normal tracking activities. The same radar operating at Cape Kumukahi would interfere with MKO optical/infrared operations. Radars at both Palima and Kumukahi would exceed the VLBA system temperature threshold.

Terrain shielding and management of radiated power level, sector blanking, sidelobe energy control, frequency coordination and reduction of out-of-band emissions will be implemented to reduce the potential for radio frequency interference to acceptable levels as specified by the International Astronomical Union for optical/IR telescopes (power density less than $2.\mu W/m^2$) and as specified by the National Radio Astronomy Observatory for radio telescopes. These mitigations will be strictly enforced.

As the Spaceport moves to the design phase, continued coordination with UH IfA will be mandatory and enforced. Actual measurements of radar signal propagation will be necessary to establish acceptable locations and operating parameters. Guidelines for the location and operation of range instrumentation systems will be made in coordination with and approved by the UH Institute for Astronomy.

3.0 Particulate Contamination

See Appendix C of the FEIS for further analysis of stratospheric wind data to determine the frequency of winds towards the Mauna Kea Observatories.

Effects From a Southern Launch. The exhaust plume from a southern launch will be carried away from Mauna Kea both below and above the tradewind inversion but could be carried back into the field of view in the stratosphere. Assuming westerly winds with speeds in excess of 10 m/sec at the highest altitudes, the plume could take about seven hours to clear the field of view of MKO. The clearing is relatively slow due to the initial launch vehicle trajectory due south of the observatories and transport winds normal to this trajectory.

A potential worst case situation occurs during January when winds from the south at 5 m/sec occur at an elevation of 20 km. The exhaust plume from a southern launch at that time could take 7 hours to clear the MKO field of view. In addition, the plume would be carried back over the observatories in the southerly winds.

Effects From an East Launch. An east launch directed along a 90 degree azimuth flies away from the Mauna Kea observatories. During conditions when westerly winds at 10 m/sec occur, as assumed for the southern launch, the plume would take about three hours to clear the field of view. The clearing is faster than the south launch because of the assumed transport winds in the same direction as the launch trajectory and away from the observatory. Winds in a direction other than westerly and at speeds other than 10 m/sec would produce different clearing times. These will vary depending on the season.

Based on upper air sounding data, the easterly winds that occur during July--most likely representative of the summer months--are in a direction that will carry the exhaust plume from an easterly launch back toward and to the south of the observatories. Wind speeds during these conditions are relatively high, however, so plume clearing times will be relatively short.

Mitigation. Impacts from launch operations on the observations made at Mauna Kea must be reduced to an acceptable level by selecting launch periods that have typical lower-level winds--from the northeast up to the tradewind inversion and from the west above the

inversion--and no southerly component of the upper-level (above 20 km) winds. This latter restriction is necessary because southerly upper-level winds could transport the plume back over the observatories, which is unacceptable. The limited data available indicates that these stratospheric winds vary in speed and direction with both altitude and season.

In addition to the general wind-pattern restrictions described above, there should be a requirement that the plume will be transported out of the observatories' field of view within a specified length of time. The field of view is defined as the region of sky above 15° from the horizon (zenith angles $<75^{o}$). Discussions with IfA (McLaren, 1993) have identified a tentative acceptable plume clearing time of about two hours. The two-hour maximum clearing time would apply from an hour after sunset to an hour before sunrise and is a starting point that could change depending on the frequency of launches and other factors.

4.0 Summary of Mitigation Measures to Prevent Deterioration of the MKO Site

- All temporary and permanent outdoor lights at the launch facility will conform with the Hawaii County Lighting Ordinance. The lighting inventory will be closely monitored to ensure that it does not differ significantly from that assumed in the EIS.

- There will be no night launches unless they are mission related and required by orbital mechanics. UH IfA will be given at least one month's advance notice of any night launches.

- Terrain shielding and management of radiated power level, sector blanking, sidelobe energy control, frequency coordination and reduction of out-of-band emissions will be implemented to reduce the potential for radio frequency interference to acceptable levels as specified by the International Astronomical Union for optical/IR telescopes and as specified by the National Radio Astronomy Observatory for radio telescopes. These mitigations will be strictly enforced.

  As the Spaceport moves to the design phase, continued coordination with UH IfA will be mandatory and enforced. Actual measurements of radar signal propagation will be necessary to establish acceptable locations and operating parameters. Guidelines for the location and operation of range instrumentation systems will be made in coordination with and approved by the UH Institute for Astronomy.

- There will be no launches--day or night--when there is a southerly component to the wind at any level, including upper-level winds.

- Launches will be restricted to times when the exhaust plume will be transported out of the field of view (sky above 15° elevation) within two hours of launch.

- All rocket launches will be coordinated with UH IfA. Calculations of plume clearing time will be made on a case-by-case basis in order to insure that there is no impact on observatory operations.

It may be necessary to pass special legislation to insure that the mitigating measures are enforceable.

F. SOCIOCULTURAL IMPACTS

1.0 Archaeological Sites

The largest concentration of sites recommended for preservation are located in and around the permanent habitation complexes found in the area of the center launch pad. These sites (along with the chain of ahu interpreted as markers of a trail connecting this coastal settlement with the interior) are believed to represent a coastal village or hamlet. An explosion on the pad or a command destruct abort could damage these sites. Protective measures will be developed in coordination with the State Historic Preservation Division.

2.0 Social Impact

About 65 percent of the people responding in 1991 key informant survey conducted for the EIS were opposed to the project. It is unknown whether additional information provided in the EIS and/or the decline of sugar and/or the slowed resort development on the Big Island would change any of their views. Although development of the launch facility will predispose Ka`u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no development can occur within the specified boundaries of the population control zone, about 10,400 acres, the project area would be predominantly open space. From a social impact perspective, the launch facility will induce fewer changes than development of the property for major resorts and associated housing development.

3.0 Shoreline Recreation and Subsistence Uses

Whenever there is a launch, the entire PCZ will be closed to the public from 6 pm on the preceding night until about 30 minutes to one hour after the launch. During the period of closure no one except authorized personnel will be admitted to the area. The closures will temporarily disrupt coastal access and use. Fishermen would be the primary user group affected by shoreline closures. Closures during weekends, the period of greatest use, would have greater impact than closures on weekdays. The intermittent effects of shoreline closure can be mitigated by limiting closures to weekday periods as much as possible.

4.0 Visual Impact

The complete facility is visible from several locations in Pahala. Residents will see two 175 foot- to 225-foot-high mobile service towers along the coastline. The towers will be highly visible because the ocean will serve as a backdrop and the duration of the view will be continuous. Because the elements will be introduced into a landscape which is currently undisturbed by structures, the towers will intrude upon the middleground line form created by the shoreline. Visual impact will be high.

The facilities will be highly visible from certain viewpoints along Highway 11, in areas characterized by a landscape of pasture/shrubland. The impact will be the highest for northbound motorists because the view of the facilities will be in front of the observer and within the field of view for a longer period of time.

An evaluation of visual impact is very subjective and depends upon individual preferences. Although the use of colors that blend into the surrounding terrain, non-reflective roofs, and appropriate landscaping around launch-site buildings should serve to mitigate most visual impact, the launch pad structures, radar and communications dishes are not as amenable to design

mitigation. It is assumed that the degree of negative reaction will relate to the degree of acceptance of the project by the viewer.

G. IMPACTS ON HAWAII VOLCANOES NATIONAL PARK

1.0 Land Use

The National Park Service may not consider the proposed rocket launch facility as a compatible adjacent land use. It should be noted, however, that it is unlikely that the lands in question will remain undeveloped indefinitely. The PCZ was established to maintain a safety buffer zone for launch operations. Since no additional development will be allowed within the PCZ, the land in question will remain in its wilderness state as open space.

2.0 Recreational Uses

Launch facility operations are not expected to have a significant direct effect on recreational users of the HVNP, although rocket launches will occasionally disrupt the wilderness character of the backcountry portions of the park.

3.0 Visual Impact

The proposed launch site will be visible from various locations within the southern wilderness area of the Park. The entire Spaceport facility will be visible from areas near Pu`u Ulaula, just south of the southern boundary of the site. The primary user group that would experience these views is those Park visitors who are willing to hike several miles in order to experience a remote, serene ambience and are expecting to see an undisturbed landscape. The introduction of Spaceport facilities into this viewshed could have a significant impact on the users' wilderness experience.

4.0 Night Sky

From the Kue`e Ruins, approximately 9 km northeast of the Spaceport site, the proposed launch facility would produce a visible glow and could be observed directly due to lighting associated with operations. This has the potential of reducing the number of stars visible to the naked eye in that part of the sky by about 20 percent. With proper lamp shielding, as required by the Hawaii County Lighting Ordinance, the sky brightness at a zenith angle of 75 degrees would be significantly less bright than a sky with just a first-quarter moon. Most of the sky would remain quite dark, and significant effects on the enjoyment of the night sky by Park visitors would be unlikely.

5.0 Noise

Natural quiet is considered an important park resource. The potential impacts on HVNP are:

- The proposed emergency diesel generator unit in the Technical Operations Facility even if muffled by 25 dBA, could be audible in the most southern end of the Park. Implementation of 40 to 45 dBA mitigation measures to the diesel unit are necessary to approach inaudibility in all portions of the Park.

- Noise from helicopter operations could affect the park if ingress and egress to Palima Point are within or near the Park boundaries. Restricting routes to those over the ocean and conducting all routine sweeps at distances greater than one mile from the Park boundary and preferably at lower altitudes should effectively mitigate this potential impact.

- There would be intense sound levels from rocket launches for several minutes with maximums of about 93 dB at the HVNP Visitor Center. At this distance, little high frequency noise will be heard. The sounds of a rocket launch will be similar to the rumble of distant thunder.

6.0 Transportation Spills

Effects on Human Health. Although the spills analyzed for the Park do not pose a significant cancer risk as defined be EPA (1.1 in 10,000), it is important that an emergency response team be available to accompany transportation vehicles. The results of the noncancer hazard analysis indicate that persons within 20 m (66 feet) of a spill of hydrazine or nitrogen tetroxide under unfavorable weather conditions could suffer severe adverse health effects, even if the HAZMAT team following the transportation truck is able to cordon off the spill area, contain the spilled product, and either cover the spill or remove it.

Effects on Sensitive Ecological Species. For the worst case scenario assessed, the highest concentrations were estimated to be closest to the highway. Within 20 m of the highway, estimated concentrations of all three substances - hydrazine, UDMH and nitrogen tetroxide - were above levels that have been found to produce adverse effects. The concentrations of these compounds, however, decreased in distance from the site. Only N_2O_4/NO_2 was still unacceptably high at 1 km from the site.

While estimated concentrations of the three substances could potentially produce adverse effects to biota close to the highway (there have been reports of listed species within 1 km of the highway), the three most sensitive habitats within the Park are located farther away from Highway 11 and it is unlikely that they would be affected by spills.

Other Effects. If an accident involving a hazardous propellant occurs--even if there is no leak or spill--a safety zone would be established to protect the public from danger. The extent of this zone would vary by type of accident and release. The duration would also vary; therefore, certain highway segments could be closed for hours, which is significant because there are no alternate roads to Highway 11. This type of closure is expected to be very infrequent.

SECTION III: ENVIRONMENTAL MANAGEMENT CONSIDERATIONS

A. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Development at Palima Point will directly impact about 10 percent of the 10,400 acres proposed for the launch facility; the remaining 90 percent will be a safety buffer zone that will remain in open space. Over the long term development of the area would be minimal, however, it would be periodically and regularly exposed to the risks of hazardous operations.

The site does not provide an important habitat for any protected species; however, native birds and bats forage across the area and protected species of sea turtles nest on adjoining beaches. While birds and bats may benefit from a lack of development in the PCZ, in the short term, turtle populations could be at risk. A larger human population in the area and improved coastal access may inhibit turtle nesting. Lights may disorient hatchlings, increasing mortality. These types of risks, however, are not restricted to Spaceport development, but would be present in any residential, commercial or industrial use of the site.

The presence of a Spaceport, and the implementation of the shoreline access management plan, will provide the management structure and security resources needed to minimize impacts to these environmental resources. At other launch facilities (Cape Canaveral AFS, Vandenberg AFB), the NPS, USFWS, and the Nature Conservancy actively manage the on-base environmental resources in order to maintain and enhance long-term productivity. Similar arrangements with agencies will be made to fill this role at Palima Point.

Without the Spaceport, in the short term the area will most likely remain in agriculture. The inexorable growth of population and urban expansion, however, may eventually spur other development on the site. Such development may not present the risk of intermittent exposure to hazards, but may bring subdivision and development that offers less opportunity to preserve the open space and wildlife habitat. It should be noted, however, that the geological hazards on the site may preclude housing development in some areas.

Within the PCZ, environmental risks can be partially compensated for by increased opportunities for environmental management. In contrast to this, the environmental risk at certain areas along the transportation corridor--including areas within the HVNP--is not accompanied by a corresponding opportunity for mitigation because there will be no increased opportunity for long-term environmental management of resources in these areas to reduce the potential risks.

B. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The construction and operation of the Spaceport will consume mineral and biological resources, as will the construction and operation of off-site improvements. Numerous types of building materials will be required including steel, aluminum, wood and concrete. Other expendable supplies will include paper, water, paint, plastics and many others.

A relatively small area of wildlife habitat will be cleared for buildings and other uses. Petrochemicals will be used to generate electricity and in engine fuels and lubricants. Human resources will be expended during the construction period, throughout the operation of the facility, and to develop and operate the associated infrastructure systems.

The existence of the launch facility, and the necessary security systems around the PCZ, will alter patterns of recreational and subsistence use of coastal resources. The wilderness character of the area could also be altered. Over-exploitation of marine and coastal resources, if not carefully monitored, could irreversibly damage habitats and populations of wildlife such as the threatened green sea turtle.

Structures will encroach into previously unobstructed natural viewplanes. The stability and tranquility of a rural, plantation-based community will be altered, although projections indicate that the underlying growth in population in the region will eventually affect these changes in any event. The very presence of the launch facility will introduce a new element of risk--real and perceived--into the lives of residents near the site and along the transportation corridor.

SECTION IV: UNRESOLVED ISSUES

Unresolved issues will be addressed prior to the design, construction and operation of a launch facility at Palima Point. It is assumed that a Supplemental EIS will be prepared when an actual project is defined.

- The State must acquire control of the land for the launch facilities. This will include negotiations with the Office of Hawaiian Affairs for use of ceded lands.
- Intensive archaeological and botanical surveys of areas to be disturbed by project facilities and infrastructure must be made.
- Archaeological mitigation must be approved by the State Historic Preservation Division.
- Actual construction impacts must be determined and assessed once the facility is designed.
- Extensive meteorological monitoring (of a least one years' duration) from ground level to the upper atmosphere must be conducted--and toxic dispersion/diffusion, explosive overpressure and debris models must be run for each specific rocket that will be launched--before the launch facility becomes operational.
- Additional modeling of particulate transport in the stratosphere and troposphere must be conducted to evaluate potential impacts on astronomy observations at MKO and to determine specific launch restrictions.
- Modeling of plume transport and clearing times--based on each specific rocket--must be conducted prior to each launch.
- Explosive overpressure and debris effects must be reevaluated for the specific rocket(s) to be launched from the facility.
- Detailed operations and emergency response and evacuation plans must be developed and approved by the appropriate authorities prior to the operation of the facility.
- A detailed risk assessment (rather than hazard analysis) of propellant transportation of must be when the actual propellants to be used are known and when more specific statistical data is available. At that time, the "worst case" would be redefined and reevaluated.
- Flora and fauna surveys must be conducted in all areas within 1 km of the Highway from Hilo to Palima Point, except in developed areas.
- Analyses of the effects of spills on groundwater wells at various locations along the transportation route must be undertaken before any propellants are transported to the site.
- Potential impacts to Hilo Harbor must be assessed.
- The methods and hazards of transporting SRMs must be evaluated when the shipping container design and port landing configurations are determined.
- A management structure which will ensure State, County and Community involvement in the facility must be developed and implemented prior to project implementation.

SECTION I: NO PROJECT

A. SOCIOCULTURAL ISSUES

Ka`u without the Spaceport, resort development, or new subdivisions would retain its rural character and existing life-style. Many respondents to a survey conducted for the project (Matsuoka, DEIS Appendix IXC) stated a preference for having nothing about Ka`u changed. No project, however, does not mean that nothing about Ka`u will change. Ka`u will not remain the same, because other trends and forces, projected to be of greater significance than Spaceport development, will continue to exert their influences on the future of Ka`u.

It should be noted that under existing conditions, without major new economic development projects, the rate and degree of social change in Ka`u is determined by and will continue to be determined by the build-out rates of existing and proposed subdivisions. Changes are taking place that are associated with inmigrants settling in Ka`u subdivisions and the degree of change is expected to increase gradually with future arrivals. The build-out rates in Ka`u subdivisions have historically been slow because a large percentage of them lack infrastructure such as water and electricity; there are few job opportunities; and residents are remote from services and shopping. Although the lots and homes are in the affordable range, the location is considered less than desirable for most prospective mainland buyers. Overall changes, based on past and current growth trends, have been gradual; however, cumulative changes measured over a protracted period may be significant.

People having different backgrounds and value systems moving into Ka`u will continue to change the social environment of Ka`u. The degree of change is expected to increase gradually with future arrivals. The rate of change would be accelerated somewhat with development of the Spaceport.

B. KA`U ECONOMY

Employment. Without alternative economic development, the phase-out of sugar could lead to serious unemployment rates in Ka`u. This is believed to be a more critical problem if the Spaceport is not developed. In a worst case scenario, laid-off sugar workers could experience chronic employment problems; many of whom, without viable alternatives, would be forced to uproot and seek employment elsewhere. There are two sides to this issue, however. Creation of new employment opportunities would assist these workers, however, large-scale economic development could bring social and economic consequences, both positive and negative, that are shared by all segments of Ka`u.

The severity of the unemployment problem resulting from a decline in sugar production depends on the viability of diversified agriculture. Area landowners are currently experimenting with orchard crops, such as citrus, mangoes, and eucalyptus for paper and fuel. If these ventures prove successful, they may partially compensate for employment losses resulting from a decline in sugar. The phase-out of sugar would affect approximately 240 workers. Many of these

workers could be transferred into the orchard crop workforce, although production techniques in these areas require fewer workers.

Economic Activities To Replace Agriculture. It is unlikely that the entire inventory of former sugar lands in Ka`u would sit idle if the Spaceport is not developed. Other development options, including resort expansion and housing, are being considered. Some landowners are favorably disposed toward resort development in Ka`u (e.g., Sazale Black Sands Resort). Although these resort facilities would be owned and operated by non-Ka`u residents, they are expected to stimulate economic growth throughout the region, compensate for declining sugar, and create a market for fallow land. The estimated number of direct, and indirect jobs to be generated by the Sazale Black Sands Resort is 460, enough jobs to absorb laid off sugar workers.

The construction of new housing is viewed as a part of natural urban expansion. That is, the existing communities of Pahala and Na`alehu would be expanded to accommodate a growing population. This would be a timely venture given the expected need for more housing due to resort development and housing shortages in neighboring districts. The scope and magnitude of housing developments would depend upon numerous factors, including marketability, resort development and job growth, community responsiveness, and potable water development.

Resort and housing developments would bring changes to the Ka`u region. A large influx of newcomers from outside of Hawaii would affect existing local life-style and increase demands on resources (e.g., recreational, water). Other high-growth communities on the Big Island between 1980 and 1990 (e. g., North Kona 62 percent, Puna 77 percent) have experienced significant changes related to population growth and demographic turnover, including increased infrastructure and public service requirements and an increase in social problems. In a more positive light, resort developments on the Big Island have provided employment opportunities to locals and newcomers, and have provided rural communities with new amenities and human resources.

Economic Consequences of No Project. Without the launch facility, an average of approximately 400 construction jobs over a 4-year period would not be created. On-site expenditures of about $420 million would not be made. Neither would expenditures of about $50 million for support facilities (including desirable infrastructure improvements), homes, hotels, and other businesses. About 600 indirect jobs during construction would not be created, but similar jobs could be created by any large construction project on the Island.

Once operational, the Spaceport is expected to provide about 270 relatively high-paying jobs. Another 420 indirect jobs--about 250 of which would be in Ka`u--are predicted. Again however, these indirect jobs could be created by alternative developments in Ka`u. Of the approximately 690 direct and indirect jobs resulting from Spaceport development, about 460 would be expected to be filled by local workers. The population increase on the Big Island associated with the approximately 230 inmigrant workers is about 550 total new residents (480 in Ka`u). Population increases associated with Spaceport development, however, are expected to account for only 21 percent of regional growth by the year 2005.

The Spaceport would also be expected to increase Ka`u visitor counts due to transient workers, their families, and launch spectators. The influx of people associated with the launch facility would tend to accelerate change within the traditional, plantation-based community. As an alternative, community-based economic development (CBED) may provide employment opportunities without the social consequences of large-scale development, but its viability on this scale in Hawaii is as yet unproven.

Without the launch facility, the 180 new housing units on the Big Island (160 in Ka`u) would not be required. Impacts on land values--both positive for commercial and industrial

property near the Spaceport site, or negative for lands within the PCZ--would not occur.

Expected net increases to annual State ($4 million) and County ($3.7 million) revenues from the Spaceport and resultant economic activities would not occur, nor would the $23.8 million in State revenues from construction activities. Here again though, other types of development could have similar economic impacts on State and County governments.

C. LAUNCH-RELATED HAZARDS

If the launch facility is not developed, the risk of exposure to toxic chemicals would be eliminated or greatly reduced, as would the potential for property damage from accidents due to launch-related activities.

The concerns relative to the effects of launch operations on global warming and depletion of stratospheric ozone would remain, since the launches would almost certainly take place elsewhere. Launches from higher latitudes would have cumulatively greater global impacts than they would from Hawaii because the greater energy consumption required to achieve a comparable orbit translates into shorter satellite life span and more frequent replacement launches.

SECTION II: ALTERNATIVE SITES

A. OVERVIEW OF THE SITE SELECTION PROCESS

A comprehensive site selection study was completed in 1988. Sites were identified in seven locations based upon the following criteria: safety and population considerations; the ability to adequately support launch operations; and performance. These locations were: North Hamakua, Kea`au Ranch, Pahoa-North, Kapoho, Palima Point, Kahilipali Point, and Ka Lae (Figure IX-2.1). These sites were screened in a 3-step process. Throughout the screening process, population safety was an overriding criterion to ensure the maximum degree of safety. Sites with concentrations of population within the PCZ were eliminated from consideration.

All sites had to be capable of launches into equatorial and polar orbits in order to capitalize on one of Hawaii's unique strengths. Other screening criteria included: geologic conditions; land availability and ownership; residential and other development patterns; transportation access and the ability to service other infrastructure needs (e.g., power, telecommunications, water, wastewater, access to labor and housing); environmental, social, cultural and archaeological and other issues; impacts on astronomical activities on Mauna Kea and Mauna Loa; and impacts on air and sea traffic.

The most favorable locations for a space launch facility were the Palima Point and the Kahilipali Point locations. The rationale for choosing these two locations reflects the relative importance of the types of screening factors in applying them to the seven locations. Safety was the most important consideration--followed by launch operations and performance--in screening and eliminating locations. Only Palima Point and Kahilipali Point met both safety and operational criteria.

B. COMPARATIVE EVALUATION OF THE TWO MOST FAVORABLE SITES

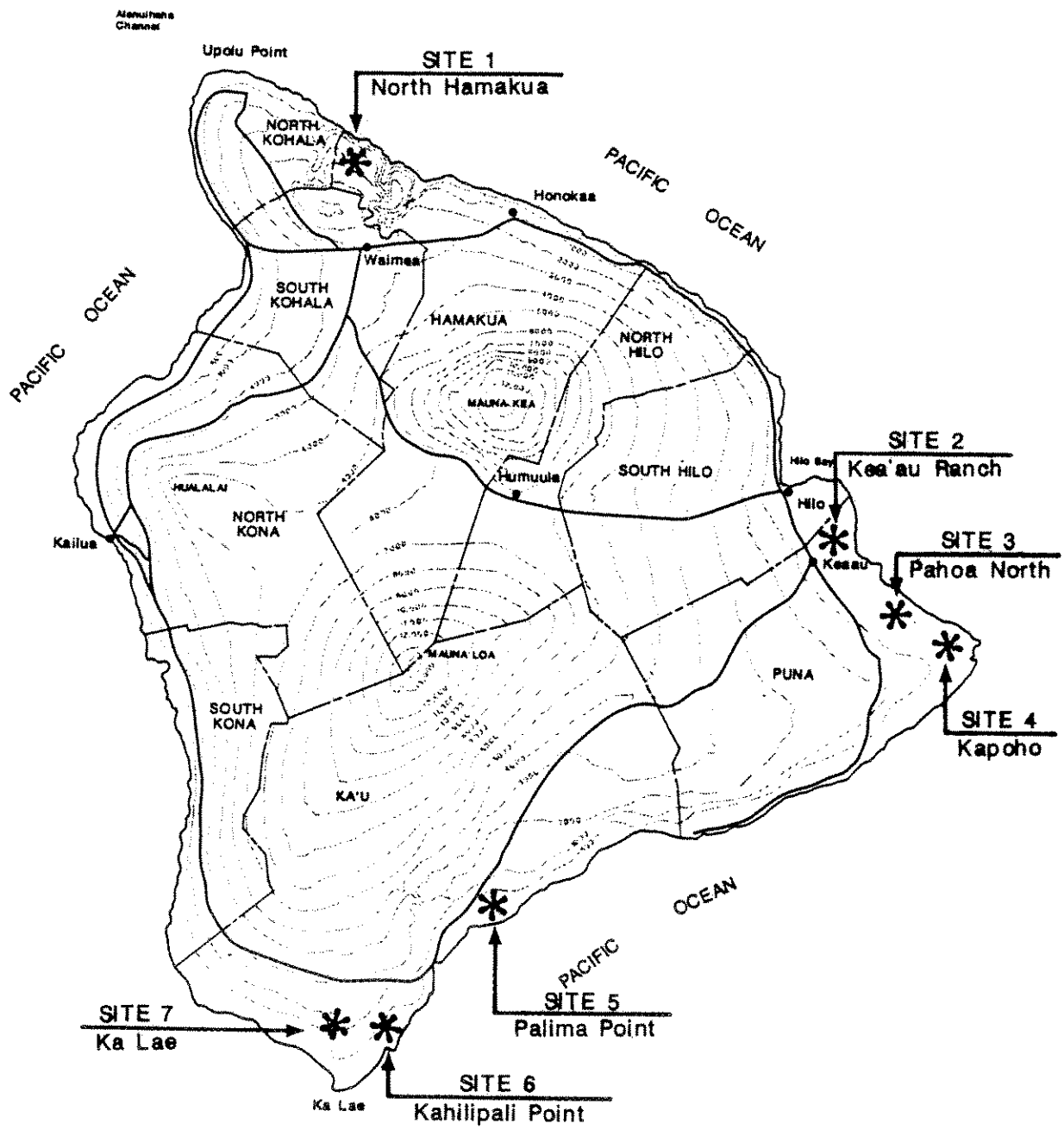
The two candidate sites were considered equally satisfactory on the basis of launch operations, safety and effects on MKO. The Kahilipali Point and Palima Point sites were then evaluated and compared by the following criteria: natural hazards, environmental resources, recreational resources, infrastructure and land use/ownership issues. A discussion of the comparative evaluation for each of the above criteria follows.

1.0 Natural Hazards

Kahilipali Point. There are four types of natural hazards that affect the project area: (1) storm waves and tsunamis; (2) seismic activity; (3) volcanic hazards; and (3) floods.

Storm Waves/Tsunami. A threat of tsunami inundation exists in coastal areas lower than Elevation +40 feet Mean Sea Level (MSL).

Seismic Activity. Two fault systems could affect the Kahilipali site: (1) the Kaoiki fault system--still considered active--which occurs along the southeastern flank of Mauna Loa and



Source: ADL, 1988

Figure IX-2.1
ALTERNATIVE SITES CONSIDERED

borders the southwest flank of Kilauea on the west frequently generates earthquakes; and (2) the Wai`ohinu fault, which passes within one-half mile of Wai`ohinu and extends 4.5 miles southeastward towards Waikapuna Bay.

Volcanic Hazards. A large portion of the Kahilipali Point site is probably located within a zone that may be sheltered from future upslope volcanic eruptions. The Kahilipali Point area is further away from the active portions of both Kilauea and Mauna Loa volcanoes than is the Palima Point area. Past lava flows tend to be shorter and topographic features at Kahilipali Point could act as natural barriers for future lava flows approaching from the Mauna Loa Upper southwest rift zone. Additionally, there has been a lack of recent historical lava flows in the area.

Flooding. No flood study was done for the Kahilipali Point site.

Palima Point. Natural hazards at Palima Point are discussed in detailed in this EIS. To summarize:

Storm Waves/Tsunami. Areas below 20 m elevation (60 feet) may be affected; historical run-up in excess of 12 m (40 feet) has been observed in the region. Only one launch pad is likely to be affected by tsunami run-up. The other launch pads and facilities are located at higher elevations and less vulnerable to inundation.

Seismic Activity. All parts of the Palima Point launch facility are located within 10 km (6.25 miles) of the Kaoiki-Honu`apo fault zone. Because the presumed fault is within approximately 10 km of the ground surface throughout the region, any given location is subject to essentially the same seismic risk as the surrounding area.

Volcanic Hazards. The proposed launch pads are located within Hazard Zone 1, the zone of highest hazard. The risk of inundation by lava at the Palima Point site varies from moderate to high.

Flooding. Flooding is common at the upper portion of the site and reported to be rare to non-existent at the lower edge adjacent to the ocean.

Site Comparison. Kahilipali Point would be more prone to tsunami and coastal run-up than Palima. Earthquake hazards are similar throughout the southern portion of the Island of Hawaii therefore there would be no difference between the sites on this criterion. The Kahilipali Point area is further away from the active portions of both Kilauea and Mauna Loa volcanoes than is the Palima Point area. Past lava flows tend to be shorter and topographic features at Kahilipali Point could act as natural barriers for future lava flows approaching from the Mauna Loa Upper southwest rift zone. Additionally, there has been a lack of recent historical lava flows in the area.

In summary, Kahilipali is more prone to tsunami and Palima Point to inundation by lava flow. Because there are no mitigation measures for lava flow, the Kahilipali Point site would be preferable based on Natural Hazard criteria.

2.0 Environmental Resources

Kahilipali Point. Important flora, terrestrial and marine fauna, and archaeological resources of the site are discussed below.

Sensitive Native Plant Communities and Endangered Species. Native dry forest/shrubland

species can be found in fairly large numbers on the site. The coastal strand is fairly well preserved in places. Three candidate endangered species, the `aiea (*Nothocestrum breviflorum*), kauila (*Colubrina oppositifolia*) and `ohai (*Sesbania tomentosa*) occur on the site.

Terrestrial Fauna. One endangered Hawaiian Duck was seen on the site during a 1990 field survey. Hawaiian Hoary Bats have been seen by others in the area but none were seen during the survey. The Hoonoua Wetland is located within the proposed PCZ, near Kamilo Point. The following Federally-listed endangered birds have been observed in this wetland, although not during the 1990 survey: Hawaiian Gallinule (*Gallinula chloropus sandvicensis*), Hawaiian Coot (*Fulica americana alai*), and the Black-necked (Hawaiian) Stilt (*Himantopus mexicanus knudseni*).

Coastal Ponds. Nine anchialine pools were located in the Kahilipali Point area. Ponds are most common on low lying flats near Ka`alu`alu Bay. Three of the most conspicuous pools at Kahilipali have been biologically degraded with the introduction of exotic fishes; other pools may be characterized as having the usual complement of native species.

Nearshore Marine Resources. The Kahilipali Point site is on undeveloped coastline, most of which is practically inaccessible to the general public and has been so for many years, therefore, the coastal resources are relatively pristine. Despite the obvious input of groundwater and its nearshore influences, the marine waters fronting the site may be characterized as having a high clarity and a water chemistry typical of well-flushed, open Hawaiian coasts.

The inaccessibility to marine resources usually exploited by man has resulted in communities that are undisturbed; fish communities are diverse and numerous large predaceous species are present (i.e., those species that are normally removed first by fishing pressure).

Sea Turtles. Sea turtles are a common feature along the Ka`u coastline; the two species seen are the green turtle and the hawksbill turtle. At Kahilipali, turtles were located in the vicinity of Ka`alu`alu Bay.

Historical/Archaeological Sites. Twenty-three sites are located along the coastal portion of the project area. Inland portions of the proposed site were not inspected and as yet unlocated sites are certainly present.

The site complexes occur on a variety of geological surfaces including sand, pahoehoe and 'a'a lavas. The complexes represent pre-historic Hawaiian fishing settlements, though a few have been utilized historically as evidenced by historic era artifacts. The complexes consist of a wide range of feature types, including petroglyphs, habitation structures, shelters, possible burials, trails, canoe sheds, lava tubes/sinks, walls and agricultural features. Historic features and land modifications are also evident. A number of the complexes include features with high cultural and interpretive value.

In general, the archaeological findings from a brief reconnaissance can be summarized as follows:

- The coastal strip from Waikapuna Bay to Ka`alu`alu Bay contains numerous site complexes, some of which represent village-like clusters of habitation and related features.

- The coastal area with greatest site density is between Ki`i and Lae o Kamilo. Also the more architecturally impressive structures are within this general area.

- The lava tube/sink Waipouli was probably a major source of potable water during prehistoric time, and was definitely utilized during historic times.

- The petroglyph fields observed are in excellent condition and contain a wide range of figure types. The petroglyph fields have recognizable differences between them which may be indicative of different functions.

Palima Point. The environmental resources on the Palima Point site are described in detail in this EIS. A brief summary follows.

Sensitive Native Plant Communities and Endangered Species. None were identified during a reconnaissance survey of the entire site and an intensive survey of the 850-acre launch pad area.

Terrestrial Fauna. Only one endangered species was found on site during field survey conducted in 1990--the Hawaiian hawk (*Buteo soliarius*). In addition, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was observed in the Punalu`u area, south of the Population Control Zone (PCZ).

Coastal Ponds. Only one anchialine pool was located within the PCZ at Palima Point. This pond is in the form of several large interconnected irregular cracks clustered together that parallel the shoreline in a broken fashion for approximately 800 m (nearly one half mile). Species present include the alga *Hildenbrandtia sp.*, shrimp opae`oeha`a (*Macrobrachium grandimanus*), o`opu`akupa (*Eleotris sandwicensis*), and an unidentified species of goby.

Nearshore Marine Resources. The marine communities fronting the proposed launch facility at Palima Point are situated in a very high-energy area, exposed to the northeast tradewinds. The substratum is comprised of pahoehoe and basalt boulders with very little reef development present. This substratum drops away rapidly such that oceanic waters are within 200 to 300 m of the shoreline. The marine resources present in this area are representative of those found in other isolated, high-energy Hawaiian nearshore environments.

Sea Turtles. The marine habitat contiguous to the proposed project site is suitable for the threatened green sea turtle and the endangered hawksbill turtle, particularly at Kamehame Hill, in the vicinity of Nahuluhulu Point, offshore of Kane`ele`ele Heiau, and at Punalu`u Bay. During field surveys, approximately 41 turtles were observed; most were offshore of the proposed project site. None of those observed were of the endangered hawksbill variety. No turtles were encountered offshore immediately contiguous to the proposed launch pad locations. Punalu`u Bay is a recognized turtle habitat that is about 350 m southwest and the PCZ.

Historical/Archaeological Sites. Most archaeological resources are concentrated along the coastline. One exception is the northeast corner of the PCZ where a relatively low density of archaeological resources exists; it is associated with the 1823 lava flow. Kane`ele`ele Heiau is located outside of the PCZ. This site, which contains over 100 associated structures, comprises the major site complex in the area.

Site Comparison. It was the opinion of researchers who surveyed the two sites that Kahilipali Point was the richest in environmental resources. The majority of archaeological sites at Kahilipali Point had high cultural and interpretive value. It was recommended that the majority of the sites be preserved. Although many of the archaeological sites at Palima Point are significant and should be preserved, construction of the launch pad areas can be accomplished without disturbing any of them. Based on environmental resources, the Palima Point site is preferred over Kahilipali Point.

3.0 Recreational Resources

Kahilipali Point. The Ka`alu`alu Bay area is used for recreation by local residents. The beaches between Waikapuna Bay and Ka`alu`alu Bay area are used less frequently because access is difficult. Access to much of this area is controlled by private land owners, who generally allow public access by permit. Shoreline fishing and limu gathering and opihi picking are common activities in this area.

Palima Point. Access to the shoreline portions of the site is difficult. Recreational uses are limited. The focal point of shoreline activities is Kamehame Beach, a cobble beach, usually awash, cut into a cinder cone in the southwestern portion of the PCZ. Kamehame Beach can be reached on foot along a stepping-stone trail which runs from the northern end of the Kane`ele`ele Heiau complex. Several *mauka-makai* trails intersect the trail. The trail is used by hikers, fishermen and `opihi pickers who park at the Punalu`u boat ramp.

Site Comparison. The recreation resources at Kahilipali Point are more significant than at Palima Point. Although a shoreline access management plan would allow controlled use of the shoreline at both sites, operation of the Spaceport at Palima Point would be less likely to produce negative effects on recreation users than building the launch facility at Kahilipali.

4.0 Infrastructure

Both sites are undeveloped with only 4-wheel-drive trails for on-site access. The principal distinction between Kahilipali Point and Palima Point is that the distance from Hilo is 12 miles longer to the Kahilipali site. The Highway between Palima and Kahilipali is narrow and has steeper grades than the other segments. Access roads from the highway to the site would also be approximately 1.6 miles longer at Kahilipali than at Palima Point.

The longer distance to Kahilipali Point means that toxic propellants and rocket parts would also have to be on the highway for a longer time. For these reasons, Palima Point is preferable to Kahilipali Point as a site for the launch facility.

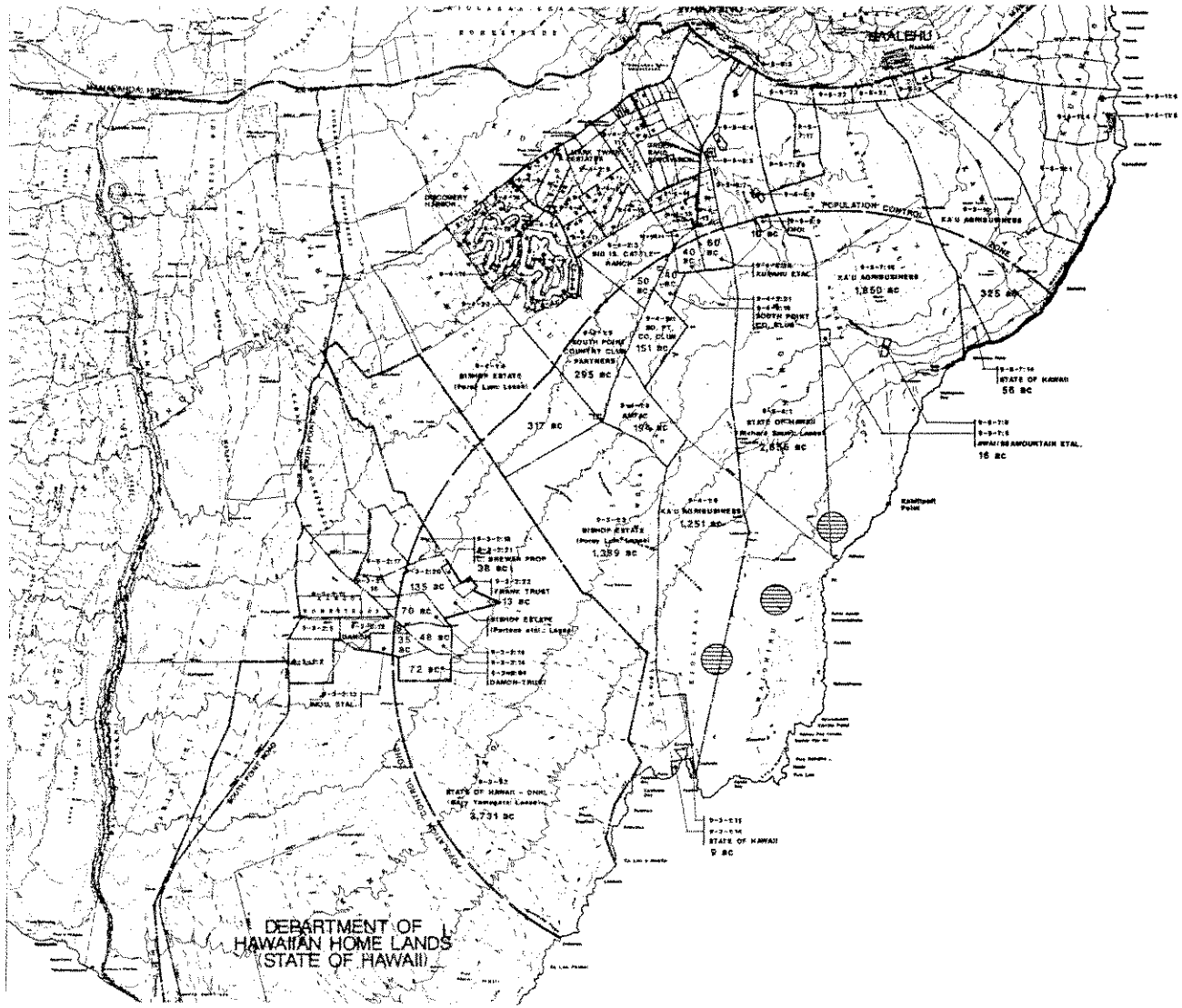
5.0 Land Use and Land Ownership

Kahilipali Point. Most of the area is within the State Agriculture District; some of the coastal areas are in the Conservation District. Most of the parcels within the population control zone are zoned Agriculture-20 by the County of Hawaii, however, there is some Agriculture-1 zoning on parcels near the existing subdivisions. The coastal portions of all affected parcels are located within the County of Hawaii Special Management Area.

There are no population settlements within the boundaries of the PCZ at the present time, however, one landowner has begun preliminary work to subdivide some of the area. The town of Na`alehu and several subdivisions are located within 1 to 3 miles of the site boundary. The predominant land use within the PCZ is grazing.

There are 14 landowners within the PCZ (Figure IX-2.2). The majority of the acreage is either owned or controlled by the State of Hawaii (about 2,720 acres), the Department of Hawaiian Home Lands (3,731 acres), C. Brewer and subsidiaries (3,464 acres) and Bishop Estate (1,841 acres). There is a high probability that the State lands are part of the Hawaiian ceded public lands trust. Some of the smaller parcels have multiple owners.

Palima Point. Most of the area is in the State Agriculture District, some of the coastal areas are in the Conservation District. All of the parcels within the PCZ are zoned



NOTE: ACREAGE SHOWN IS AREA WITHIN POPULATION CONTROL ZONE

- PROPERTY LINE
- OWNERSHIP BOUNDARY: DEPT. OF HAWAIIAN HOME LANDS
- STATE HIGHWAY
- COUNTY HIGHWAY
- COUNTY ROAD
- PRIVATE ROAD
- IMPROVED LOTS

Source: Redi Realty Directory, 1991

Figure IX-2.2

LAND OWNERSHIP AT KAHILIPALI POINT

Agriculture-20 by the County of Hawaii. The coastal portions of all affected parcels are located within the County of Hawaii Special Management Area.

Within the PCZ, about 600 acres of land near Pahala are planted in macadamia nut orchards, and about 5 acres are planted in an experimental mango orchard. In addition, about 3,800 acres are being used for grazing cattle, however, there are plans to use about 1,600 of these acres as a dairy. Also, tailwaters from the sugar mill flow onto lands within the PCZ. About 6,000 acres, formerly used for grazing cattle, are vacant.

There are no population settlements within the PCZ. The town of Pahala is located about 4 miles to the north and the Punalu`u resort is located about 3 miles to the south, just outside of the PCZ.

There are 6 landowners within the PCZ (Figure II-1.1) including Bishop Estate (3,363 acres), IASCO (International Air Service), New Hawaii Macnut, Inc., Ka`u Agribusiness, Hawaiiana Investment Co., and the State of Hawaii. As discussed in Chapter Three, there is a strong possibility that the State-owned lands at the site are ceded lands.

Site Comparison. Land ownership and development pressures favor the Palima Point site - the relatively few owners should facilitate land assembly. At Kahilipali Point, the numerous owners and recent subdivision activity suggest that land assembly at this site would require more time and would be potentially more costly. A key factor favoring Palima Point over Kahilipali on this issue is the fact that the PCZ includes 4,000 acres of Hawaiian Home Lands. Although grazing activities could continue on the land, no homesteads could be built there.

C. SITE SELECTION

The Palima Point and Kahilipali Point sites were compared on the basis of the following factors, listed in descending order of priority: (1) environmental resources, (2) land ownership and the practicality of assembling a site, (3) recreational resources, (4) natural hazards, and (5) infrastructure. By all of the criteria evaluated--except for lava flow hazards--the Palima Point site was superior to Kahilipali. The environmental evaluations indicate that adverse impacts at the Kahilipali Point site would be more significant than at the Palima Point site. In addition, because of current land ownership and development conditions, it was anticipated that land at the Palima Point site could be assembled in a more timely fashion. The Palima Point site was therefore selected for the environmental impact analysis in this EIS.

SECTION III: ALTERNATIVES TO LAND-BASED LAUNCHES

A. FLOATING PLATFORM

A technical paper entitled "Floating Launch Platform Options" was prepared by the University of Hawaii (UH) for the Office of Space Industry (OSI) to investigate options which appeared to have merit for launching medium-sized space vehicles offshore from Hawaii. Each launch floating platform option was discussed with respect to technical complexity, risk areas, pros and cons, and estimated time and cost to develop the platform. The time and cost required to develop the range and instrumentation and tracking systems was assumed to be the same as for the land based Ka`u sites.

The recommended option involves the following steps:

1. Building up and checking out the launch vehicle stages in a technical support facilities located southeast of Hilo airport.

2. Transporting the stages to the harbor by roadway and then by special trestle to a modular assembly and integration building located inside Hilo harbor.

3. Assembling the various launch vehicle stages vertically on a mobile launch platform in the assembly and integration building.

4. Transferring the mobile launch platform with the assembled rocket from the assembly building to a floating launch platform moored alongside the building. The floating launch platform is a small water area twin hull (SWATH) vessel which is a particularly stable configuration for launch purposes.

5. Sailing the SWATH platform--with the launch vehicle on board--approximately 12 miles offshore for fueling and launch.

The launch would be controlled and monitored from a separate Service/Control SWATH vessel which would stand off about 3 miles from the Launch SWATH. During launch, all personnel would be evacuated from the Launch SWATH. Although some components of the range safety instrumentation system would be located on the Service/Control SWATH, most of these systems would be located onshore.

The estimated cost of two SWATH floating launch platforms was estimated at $220 million for the vessels and their systems, and $30 million for owner-furnished equipment. This compares with an estimated $150 million cost for one land-based launch pad for medium-sized commercial space vehicles.

OSI concluded that a floating launch platform is a feasible alternative to a land-based development at Ka`u and would avoid some of the environmental impacts. Impacts from a floating on Hilo Harbor would be significantly greater than would launch facility development at a Ka`u site.

The floating platform option is a potential alternative that offers several advantages. However, current estimates indicate that a land-based option is less costly in terms of construction and maintenance. There is also some reluctance on the part of satellite and vehicle companies to place such valuable assets on an unfamiliar surface. No floating launch platforms have been constructed to date; however, some interest in the concept has been expressed. Several U.S. launch companies have performed feasibility studies. It is possible that this alternative may become viable at some future time.

B. AIR LAUNCH

Orbital Sciences Corporation and Hercules Aerospace Company have developed the "Pegasus" air-launched space booster. Pegasus is a 51-foot (15.5 m), three-stage, solid propellant vehicle carried aloft by an airplane. It is processed horizontally; ground handling and testing require a relatively short period of time and the vehicle is fully transportable allowing for rapid launch scheduling.

Pegasus is able to deliver approximately twice the payload over an identical ground launched booster. It is flown by a conventional transport/bomber-class airplane to an altitude of approximately 40,000 feet (12.2 km) and Mach 0.8. After release from the aircraft and ignition of its first stage motor, Pegasus is capable of carrying 600-lb (270-kg) payloads to 250-nm (460-km) polar orbits as well as larger payloads to lower altitude/lower inclination orbits or to suborbital trajectories.

Several enhancements are planned for Pegasus which include extending the fairing length by 6 inches (152 mm) and replacing existing avionics with Global Positioning Systems (GPS). There will also be a new top stage for added performance and a hydrazine precision kit for better position accuracy in space. Orbital Sciences is expected to increase Pegasus performance, but has also developed the ground-based Taurus vehicle to carry higher loads (AIAA, 1991, Interavia, 1991).

The Pegasus vehicle is not expected to replace any of the medium-lift launch vehicles (mELVs). Pegasus is one of the launch vehicles that OSI would like to attract to Hawaii. A significant market of larger payloads exists, however, and with current technology can only be launched from the ground. If a Palima Point launch site project is not developed, it is still possible that Pegasus could be flown from a Hawaii location if it is economically feasible. Most likely that location would not be Ka`u.

SECTION IV: ALTERNATIVE TRANSPORTATION INFRASTRUCTURE

A. BARGE LANDING FACILITY

OSI evaluated potential harbor locations in Ka`u to off-load rocket supplies from barges. In the study area, sites at Honu`apo Bay, Waikapuna Bay, Kahilipali Point, and Ka`alu`alu Bay were considered to be feasible from an engineering standpoint. Wave analysis and barge motion studies were also conducted and results were used in conceptual design of structures and operational constraints.

Harbor concepts studied included: breakwater sheltered harbors, harbors excavated into the basalt cliffs, and piers. Construction costs range from $12 million for a pier, $29 to $32 million for breakwater-protected harbors, and $55 million for excavation into the cliffs. The costs associated with site facilities total $4 million. Costs that are not included but would require more consideration for more detailed studies are the access roads, connections to utilities beyond the wharf, tankage for fuel, and any disposal needs.

The sites investigated were ranked according to engineering feasibility, operational efficiency, and cost of construction. These rankings do not consider launch site proximity constraints, or environmental and archaeological concerns. These items would require investigations if an alternative to Hilo Harbor is pursued. The results of the rankings and a discussion of the pros and cons of each, follow:

Ka`alu`alu Bay. Ka`alu`alu Bay has the most conducive natural features and best approach for barge and tow. In addition, the formation of the bay provides the most flexibility for orientation of the final configuration. Existing roadways could be improved to allow access to the site without significant excavation.

*Honu`apo Bay.* Honu`apo Bay at Pu`u o Kaau has a rock reef base to use as a breakwater platform and nearshore topography that would be favorable to backland improvements. A harbor excavated into basalt has the potential of being constructed with operational considerations that would allow barge traffic in all but the most extreme conditions. This concept also has flexibility for the final configuration, although total costs are higher than other plans.

Waikapuna Bay. The harbor at Waikapuna Bay is the least certain due to the exposed coastline and undefined bathymetry. The pier concept was not recommended due to the high amount of time that it would be unusable for loading operations. The unprotected deeper water and reflections from sea cliffs combine to place the barge in wave conditions that would exceed 4 feet over 70 percent of the year.

Detailed bathymetric charts and geotechnical studies of the study area are extremely limited. Because the design of breakwaters, excavation costs, and nearshore constraints are dependent on this information, the construction costs provided are considered to be order-of-magnitude estimates. If construction of a barge landing facility is considered further, it is recommended that more detailed bathymetric charts be prepared and preliminary geotechnical work be performed.

B. ON-SITE AIRPORT

OSI evaluated the feasibility of constructing an airport within the PCZ at both the Palima and Kahilipali Point sites. The airport would be used primarily for transportation of large rocket components to the site. It was assumed that there would be no service by commercial passenger aircraft.

Numerous criteria apply to an airfield. The most important ones considered for planning purposes were the runway and safety area surfaces and the approach and transitional surfaces.

OSI concluded that it is possible to provide a suitable airport facility at either of the sites. FAA criteria can be met except for minor penetrations of the horizontal and conical surfaces on the uphill side. Runways for large aircraft require fairly large graded areas with almost flat slopes. Providing these surfaces at either of the two sites will require significant amounts of expensive grading of hard rock.

The estimated costs of a "bare bones" airport at Palima Point is $31.5 million.

The airport feasibility study and costs were prepared for preliminary planning considerations. If a launch project is defined and the on-site airport is considered further, a reevaluation of site feasibility would be assessed with respect to the specific project siting constraints. More detailed site topography and soil conditions would enable the costs of drainage and earthwork to be estimated more accurately. Other items that would need to be defined explicitly are the type of aircraft to be used, and the environmental and archaeological effects.

SECTION I: POLICIES AND PLANS

A. HAWAII STATE PLAN

The Hawaii State Plan is a long-range, comprehensive document containing statements of the social, economic and physical goals, objectives, policies, priority guidelines and implementation mechanisms which will achieve the general welfare and prosperity of Hawaii's people. This State Plan, enacted into law in 1978 as Chapter 226, HRS, serves as a guide for the future long-range development of the State.

The goals outlined in the State Plan call for the achievement of:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.

- Physical, social, and economic well-being for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring and of participation in community life.

- Specifically, to enhance the economy, increased and diversified employment opportunities and a growing and diversified economic base are promoted, especially to benefit areas with substantial or expected employment problems. The State Plan emphasizes the promotion of Hawaii's unique geographical and technological advantages and the development of high-technology industries.

B. STATE FUNCTIONAL PLANS

State Functional Plans are prepared by State agencies to define and implement the overall goals, objectives, policies and priority guidelines of the State Plan. In addition, Functional Plans and their revisions are approved by the Governor and serve as guidelines for State and County agencies. This provides for planning consistency and coordination in all State planning. There are thirteen functional plans covering a wide range of subjects.

All County General Plans or Development Plans must take into consideration Statewide objectives, policies and programs stipulated in the State Functional Plans.

C. HAWAII COUNTY GENERAL PLAN

1.0 Economic Goals and Policies

The County of Hawaii General Plan was adopted by the Hawaii County Council in November 1989 and contains goals, policies and standards to guide the development of the County in thirteen different areas: economic, energy, environmental quality, flood control and drainage, historic

sites, natural beauty, natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation, and land use. The economic goals and policies related to the proposed launch facility include:

- The County of Hawaii shall strive for diversity and stability in its economic system.
- The County shall provide an economic environment which allows new, expanded, or improved economic opportunities that are compatible with the County's natural and social environment.
- The County of Hawaii shall strive for an economic climate which provides its residents an opportunity for choice of occupation.
- The County of Hawaii shall strive for diversification of its economy by strengthening existing industries and attracting new endeavors.
- The County of Hawaii shall encourage the research, development and implementation of advanced technologies and processes in existing and potential economic endeavors.
- The County of Hawaii shall identify and encourage primary industries that are consistent with the social, physical, and economic goals of the residents of the County.

2.0 Development Standards

Standards to guide the development of the County related to the economy are as follows:

- The island of Hawaii should be developed into a unique scientific and cultural model. The island should become a model of living where economic gains are in balance with social and physical amenities. Development should be reviewed on the basis of total impact on the residents of the County, not only in terms of immediate short run economic benefits.
- New industries which provide favorable benefit-cost relationships to the people of the County of Hawaii should be encouraged. Benefit-cost relationships as used here include more than fiscal considerations.

3.0 Courses of Action For Ka`u

The County of Hawaii General Plan contains "courses of action" for each of the nine districts in the County. There are courses of action for all of the thirteen program areas. There are six economic courses of action for Ka`u. These are:

- Resort development in Ka`u shall be kept in balance with the social and physical environment of the area. Provisions for orderly development, housing, and pollution control shall be implemented.
- The County shall assist the further development of agriculture in the area.
- The fishing industry, other ocean based industries, and aquaculture, located in Ka`u should be assisted by the County through a cooperative effort with State and Federal agencies.
- The County shall support efforts to stabilize and maintain the viability of the sugar industry.

- The natural beauty of the area should be recognized as a major economic and social asset. This resource should be protected through appropriate review processes when development is proposed.

- Preliminary to the consideration of any proposed space-related launch activities, the County shall require, in addition to standard EIS requirements, special impact assessments.

D. POLICIES AND PLANS INCORPORATED BY REFERENCE

Policies and plans incorporated into this document by reference include:

- Agricultural Lands of Importance in the State of Hawaii (ALISH) and the proposed Land Evaluation and Site Assessment (LESA) System.

- Chapter 343 HRS - State Environmental Impact Statement Law.

- Chapter 344 HRS - State Environmental Policy Law.

- State of Hawaii Ambient Air Quality Standards (Hawaii Administrative Rules, Title 11, Chapter 59).

- Hawaii Administrative Rules, Title 11, Chapter 60, Subchapter 1 Prohibitions and General Requirements; Subchapter 3 Stationary Sources, Subchapter 4 Prevention of Significant Deterioration Review.

- Clean Air Act (42 U.S.C. 1857h-7 et seq.).

- National Ambient Air Quality Standards (40 CFR 50.4-50.12).

- The Prevention of Significant Deterioration Program (40 CFR 52.21).

- EPA Area Designations for Criteria Pollutants (40 CFR 81.312).

- Montreal Accord for the Protection of the Stratospheric Ozone Layer.

- Coastal Zone Management Act (16 U.S.C. 1451 et seq.).

- State Coastal Zone Management Program.

- Endangered Species Act of 1973 (16 U.S.C. 1531, et seq.).

- State of Hawaii Historic Preservation Act (Chapter 6E, HRS).

- National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.).

SECTION II: PERMITS AND APPROVALS

A. STATE LAND USE CONTROLS

In 1961, Hawaii became the first state in the country to pass a state land use zoning law (Chapter 205, HRS). Under this law and its subsequent amendments, all the lands in the state are assigned to one of four major Districts: Conservation, Agriculture, Urban or Rural. Conservation Districts are under the exclusive jurisdiction of the State Board of Land and Natural Resources. Urban and Rural Districts are under the exclusive control of the counties while Agriculture Districts are under county control with certain restrictions.

All of the land in the Palima Point area where the launch facility will be located is presently classified Agriculture. A petition requesting reclassification of the lands required for development of the facility from Agriculture to Urban will need to be filed with the State Land Use Commission. It is proposed that the area within the Population Control Zone (PCZ) that will remain undeveloped shall remain in Agriculture classification under a Special Use Permit.

Because Conservation lands include submerged lands and territorial waters, a Conservation District Use Permit (CDUP) will be required to restrict access and use of Conservation District land during launches.

B. COUNTY OF HAWAII

The County General Plan must be amended to permit industrial uses on the land that will be reclassified to Urban. The land will also require a change in zoning following the General Plan amendment.

The launch site may also need a Special Management Area (SMA) permit from the County. The SMA includes the land within the coastal zone of the island. Widths vary but are never less than 100 yards. If a portion of the parcel is within an SMA, an SMA permit may be required for any development within the entire parcel. It is uncertain whether a Shoreline Setback Variance will be required. The launch pads will be located behind the 40-foot setback; however, they will affect the shoreline.

C. FEDERAL

The commercial operator of the launch facility will be required to obtain a license to operate from the USDOT Office of Commercial Space Transportation (OCST). This action of licensing will require compliance with the National Environmental Policy Act (NEPA).

Federal approvals must also be obtained from the Federal Aviation Administration, for restrictions of air space downrange of the facility during launches. Similarly, use of territorial waters must be controlled during launches. The U.S. Coast Guard is responsible for

the establishment of safety zones in water areas, shore areas, or water and shore areas wherein access will be limited to authorized persons, vehicles or vessels.

In addition to formal permits and approvals, operators of the proposed facility will be required to comply with Federal and State regulations relating to hazardous materials, including Department of Transportation regulations for labeling and transport; Environmental Protection Agency (EPA) and State regulations for spills and emergency response (CERCLA, SARA); and regulations protecting the health and safety of employees (OSHA) at the facility.

A list of applicable reviews, permits and approvals is shown in Table 10.2.1.

D. AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

Strict adherence to Federal safety requirements as set forth by agencies such as US DOT, EPA, etc. will minimize the probability of an unforeseen accident causing adverse effects. OCST will set stringent safety requirements for launch operations. When the project is known, an operations plan will be prepared which will include actions and contingency measures for every operation related to the launch.

On the State level, enforcement of permit conditions will insure that mitigating measures prescribed in the EIS and various permits are followed. Implementation of the Spaceport Management Plan and Shoreline Access Plan will provide State oversight to private operations at the launch site. Guidelines to be prepared in coordination with the UH IfA, together with the strict mitigating measures outlined in the EIS, will protect the qualities of the Mauna Kea Observatories site.

An emergency response and evacuation plan will be developed in coordination with Hawaii County Civil Defense, the Hawaii County Fire Department and the Hawaii County Police. In addition, all County building codes for UBC 4 will be followed in the design and construction of the facilities.

Table 10.2.1

APPLICABLE REVIEWS, PERMITS, AND/OR APPROVALS

Agency and Permit or Approval	Legislation or Regulation	Purpose
Federal		
Department of Transportation Office of Commercial Space Transport		
License to Operate CSLF	Commercial Space Launch Act of 1984, Public Law 98-575 14 CFR Ch.III, Part 400 Commercial Space Transportation Licensing Regulations	National interest, safety
Federal Aviation Administration		
Joint Use Restricted Area	Procedures for Handling Airspace Matters, 74400.2C, Part 7, Chapter 29	Closure of air space for safety during launches
United States Coast Guard		
Safety Zone Area	33 CFR Part 165	Closure of territorial waters for safety during launches
Office of Environmental Policy		
Environmental Impact Statement	National Environmental Policy Act 42 USC 4321 *et seq.* 40 CFR Parts 1500-1508 Guidelines	Environmental protection; Federal action is licensing

Table 10.2.1 (cont'd)

Agency and Permit or Approval	Legislation or Regulation	Purpose
State		
Land Use Commission		
State Land Use Districts	Chapter 205, HRS	Reclassify site to Urban; Special Use Permit for PCZ
Department of Land & Natural Resources (DLNR)		
Land Lease	Chapter 171, HRS	Transfer control of State land to CSLF
Conservation District Use Permit	Chapter 183, HRS DLNR Administrative Rules, Title 13, Chapter 2	Temporary closure of coastal waters
State Historic Preservation Office Approval	Section 106, National Historic Preservation Act (16 USC 470) 36 CFR 800 Regulations Chapter 6E HRS	Protection of historic sites
Permit to Drill or Alter a Water Well	Chapter 174C, HRS State Water Code DLNR Administrative Rules, Title 13, Subtitle 7, Chapter 168	Develop new water source
Office of Environmental Quality Control		
Environmental Impact Statement	Chapter 343, HRS DOH Administrative Rules, Title 11, Chapter 200	Environmental protection Required by state action of land consolidation

Table 10.2.1 (cont'd)

Agency and Permit or Approval	Legislation or Regulation	Purpose
Department of Health (DOH)		
Potable Water Systems	Chapter 340E, HRS DOH Administrative Rules, Title 11 Chapter 20	Provide safe drinking water, protect public health
Underground Injection Control Approval to Construct; Approval to Operate	40 CFR 122 and 156, Regulations; Chapter 340E, HRS DOH Administrative Rules, Title 11, Chapter 23	Groundwater protection
Aboveground Storage Tanks[1]	Clean Water Act (33 USC 1251 *et seq.*) Chapter 342D, HRS DOH Administrative Rules, Title 11, Chapter 55	Contain deluge water, accidental spills, prevent water pollution
Wastewater Systems Construct & Operate Private STP	Chapter 342D, HRS DOH Administrative Rules, Title 11, Chapter 62	Prevent water pollution, protect public health
Storage and Handling of Hazardous Wastes	Resource Conservation and Recovery Act (42 USC 6901 *et seq.*) 40 CFR 260 to 272. Chapter 342J HRS	Proper management of hazardous wastes
Air Pollution Control Permit: Authority to Construct or Modify a Facility; Permit to Operate	Clean Air Act (42 USC 1857h-7 *et seq.*) Chapter 342, HRS; DOH Administrative Rules, Title 11, Chapters 59 and 60	Air quality, odor control, public health

[1]New legislation on aboveground storage tanks is being considered by Congress.

Table 10.2.1 (cont'd)

Agency and Permit or Approval	Legislation or Regulation	Purpose
Used Oil Transport, Recycling & Disposal	Chapter 342N, HRS	Proper handling of used oil
Lead Acid Battery Recycling	Chapter 342I	Proper disposal of used batteries
Hawaii County		
General Plan Amendment	Hawaii County Ordinance No. 761	Allow for industrial use
Change of Zone	Hawaii County Code, 1983, Chapter 25	Rezone portion of site for industrial use
Special Management Area Permit	Chapter 205A, HRS Rule 9, Planning Commission	Temporary closure of coastal areas
Grading, Grubbing, and Stockpiling Permit	Hawaii County Code, 1983, Chapter 10, Articles 2 and 3	Environmental impacts of earth moving activities
Building Permit	Hawaii County Code, 1983, Chapter 5	Health and safety
Outdoor Lighting	Hawaii County Code, 1983, Chapter 14	Restrict outdoor lighting
Electrical Permit	Hawaii County Code, 1983, Chapter 9, Article 5, Division1	Health and safety
Plumbing Permit	Hawaii County Code, 1983, Chapter 17, Article 2	Health and safety

SECTION I: DRAFT EIS CONSULTANTS

The following individuals, agencies and firms were contacted for professional services and/or specialized advice during the preparation of the draft EIS.

A. CONSULTANTS TO MCM PLANNING

The firms and individuals listed below consulted with many individuals, organizations and agencies during the preparation of their reports. Please refer to these reports for additional names of consulted parties.

- **ACTA Inc., Torrance, CA.** Geologic and Seismic Risk Assessments; Modeling and Hazard Analysis for the Transportation of Propellants; Accident Risk Assessment for Handling and Storage Facilities; Impacts of Payload Handling Accidents; Modeling of Toxic Spills, Exhaust Gases and Vehicle Accident Gases; Modeling of Debris Dispersion Effects; Acoustic Environment Assessment; Acoustic Propagation Analysis; Sonic Boom Consequences; Modeling and Analysis of Explosive Overpressure Hazards

- **D. L. Adams Associates, Ltd., dba Darby & Associates, Honolulu, HI.** Acoustical Noise Impact Evaluation.

- **Akala Products, Inc., Honolulu, HI.** Commercial Fishing; Ocean and Shoreline Recreation and Subsistence Uses.

- **Barton-Aschman Associates, Honolulu, HI.** Traffic Impact.

- **Robert A. Baxter, Pasadena, CA., for Engineering-Science, Inc.** Effects of the Launch Facility on Observatory Activities.

- **Richard E. Brock, Ph.D., Honolulu, HI., for Sea Engineering, Inc.** Marine, Anchialine and Sea Turtle Resources; Offshore Water Quality.

- **Char & Associates, Honolulu, HI.** Botanical Resources.

- **Computer Vectors, Kailua-Kona, HI.** Research on Key Issues.

- **Cultural Surveys Hawaii, Honolulu, HI.** Archaeological Surveys.

- **Decision Analysts Hawaii, Inc., Honolulu, HI.** Group Coordinator for Social and Economic Issues; Economic, Fiscal and Housing Impacts; Management Plans.

- **Engineering-Science, Inc., Pasadena, CA.** Climate and Air Quality.

- **Leonard A. Freed, Honolulu, HI.** Birds and Mammals on the Project Site.

- **R. H. Garstang, Ph.D., University of Colorado, Boulder CO., with Engineering-Science, Inc.** Light pollution effects on MKO and Hawaii Volcanoes National Park.

- **GK & Associates, Honolulu, HI.** Group Coordinator for Biological, Water Quality, Traffic and Hawaii Volcanoes National Park Issues; EIS Writing.

- **Harding Lawson Associates, Honolulu, HI.** Geologic Hazards; Groundwater Resources; Groundwater Modeling; Construction Impacts.

- **Everett Kaneshige, Alston, Hunt, Floyd & Ing, Honolulu, HI.** Mechanisms for Land Acquisition and Control.

- **KRP Information Services, Honolulu, HI.** Deputy Project Manager; Group Coordinator for Water Resources, Energy, Hazardous Substances, and Health and Ecological Risk; EIS Writing.

- **Arthur D. Little, Inc., Cambridge, MA.** Case Studies of Economic Impacts From Other Launch Sites.

- **Jon K. Matsuoka, Ph.D., Honolulu, HI.** Sociocultural Impacts.

- **Risk Science Associates, Corte Medera, CA.** Human Health and Ecological Risk Assessments.

B. CONSULTANTS TO THE OFFICE OF SPACE INDUSTRY

- **Moffatt & Nichol Engineers, Long Beach, CA.** Barge Landing Facility.

- **Parsons Hawaii, Honolulu, HI.** Drainage and Flooding; Feasibility Study For An On-site Airport.

- **Thomas A. Schroeder, Ph.D., UH Dept. of Meteorology, Honolulu, HI.** Meteorological Data Collection and Analysis.

- **R. S. Winkler and L. H. Seidel, UH Dept. of Ocean Engineering, Honolulu, HI.** Floating Launch Platform Study.

SECTION II: FEDERAL, STATE AND COUNTY AGENCIES AND OTHER CONSULTED PARTIES

A. FEDERAL AGENCIES

Department of Defense
Pacific Missile Range Facility, Kauai

Department of Commerce
National Marine Fisheries Service, Pacific Area Office.

Department of the Interior
National Park Service, Lakewood, Colorado
National Park Service, Hawaii Volcanoes National Park
Fish and Wildlife Service.

Department of Transportation

Office of Commercial Space Transportation
Federal Highway Administration.

B. STATE AGENCIES

Department of Education

Department of Hawaiian Home Lands

Department of Health
Environmental Management Division
Hawaii County Community Mental Health Services
Ka`u Hospital & Family Health Center.

Department of Human Services

Department of Labor and Industrial Relations

Department of Land & Natural Resources
OCEA
Historic Preservation Division.

Department of Taxation

Department of Transportation
Airports Division

District Engineer, Hawaii County
Highways Division

Hawaii Community College

High Technology Development Corporation

Housing Finance and Development Corporation

Land Use Commission

Office of Hawaiian Affairs

University of Hawaii at Hilo

University of Hawaii at Manoa
Institute for Astronomy

C. COUNTY OF HAWAII

County Council

Finance Department

Planning Department

Mayor's Office

D. OTHER CONSULTED PARTIES

B.P. Bishop Estate
C. Brewer & Co., Ltd.
Castle Medical Center (Kona Office Outpatient Program)
GTE Hawaiian Tel
Hawaii Island YWCA (Sexual Assault Support Service)
Hawaii Electric Light Company (HELCO)
Hawaiian Electric Company (HECO)
Ka`u Agribusiness
Kawaihae Ranch
Locations, Inc.
MacFarms of Hawaii, Inc.
Nature Conservancy of Hawaii
S&S Dairy
Tax Foundation of Hawaii
Thiokol Corporation

SECTION III: SCOPING MEETINGS

Additional comments were received at five scoping meetings held in Kailua-Kona, Na`alehu, Pahala, Hilo and Honolulu in October, 1989. The names of persons presenting testimony (and residence and organization, where identified) for each of the scoping meetings are listed below.

A. KAILUA-KONA, HAWAII - 7:30 P.M., OCTOBER 25, 1989

State Representative Virginia Isbell, Kona
Colleen Conner
Allen Darrell
Jack C. Davis
Deighton Emmons, Jr.
Gigi Glover, Oahu
Albert L. Graves
Lynn Marie Heide, Kona
James Horner
Nancy Killian
Hank Kline, Kona
Bernard La Duke, Jr., Kona
Stephanie Lighty
Dave Lucas
Janice Palma
Mary Passero
Rebecca Pontes
Jim Rosenfield, South Kona
Frances J. Schobel
Paul Schreiber
Sandy Scruton, Hawaiian Ocean View Estates
David W. Shideler
Howard Simon
Phil Thum, Ka`u
Jeffrey L. Turner
Karen Washuta
William Wenner, M.D, Kainaliu
Jim Wiley
Ann Winestock

B. NA`ALEHU, HAWAII - 1:30 P.M., OCTOBER 26, 1989

Johnny Baldwin
Helen Behrmann, Wai`ohinu
Girad Brilliant, Hawaiian Ocean View Estates
Beverly Byouk
Marcus Castaing, Wai`ohinu
Jonathan Cole, Wai`ohinu
Keone Dancel

Margaret Dancel
Arthur De Rungs, Mark Twain Estates
Cynthia Gillette-Wenner, Volcano
L. R. (Rick) Howsley
Bernard La Duke, Jr., Kona
Mandy McCasland, Na`alehu
Margaret McGuire
Jay Maxner, Kona
Scott Martin
Donna Pfeifer, Hawaiian Ocean View Estates
Russell Turcotte
Douglas Walsh, Wai`ohinu
Susie Weaver

C. PAHALA, HAWAII - 7:30 P.M., OCTOBER 26, 1989

Tama Basa, Pahala
Marcus Castaing, Wai`ohinu
Sandy Fujioka
Gigi Glover
John Kulani
David McCasland, Mark Twain Estates
Margaret McGuire
Marti Simpson, Wai`ohinu
Cora Walsh
Joe Wilkinson, Green Sands Subdivision

D. HILO, HAWAII - 9:00 A.M., OCTOBER 27, 1989

Moanikeala Akaka, Trustee for the Office of Hawaiian Affairs
Bonnie Bator
Sandra Demourelle, Green Sands Subdivision
Gigi Glover
Mokihana K. Kainoa
Bob Lerro
Aaron Miyasato, Kanoelehua Industrial Area Association
Greg Owen
Martin C. Slade
Jim Snyder
Eric Stacey, Keeau
John S. F. Tan
Clifton Tsuji, Japanese Chamber of Commerce and Industry of Hawaii

E. HONOLULU, HAWAII - 4:00 P.M., OCTOBER 27, 1989

Senator Anthony Chang
David Campbell, Ka`u
Matilda L. Carter
Scott Carter
Kaliko Chun

Lance Foreman
Charles Fujimoto
Eileen Fujimoto
William Glover
Larry Jones
Ku Kahakalau, Center for Hawaiian Studies, UH Manoa
Shaun Kelly
Ramdas Lamb
David McFaull, Sane Nuclear Freeze Hawaii
Susan Miller, Natural Resources Defense Council
Sandra Ward

SECTION IV: RESPONDENTS TO THE NOP

The following agencies, organizations and individuals responded to the Environmental Assessment and Notice of Preparation published in September, 1989. An asterisk (*) denotes letters with no substantive comments. Copies of the letters addressed to the Office of Space Industry and responses to the comments are at the end of this section. Copies of letters from individuals to the Federal Office of Commercial Space Transportation (OCST) and their responses are also included.

A. FEDERAL AGENCIES

Department of Agriculture
Soil Conservation Service

Department of the Army
Army Corps of Engineers

Department of Commerce
National Marine Fisheries Service, Pacific Area Office

Department of Energy

Department of the Interior
Fish & Wildlife Service, Pacific Islands Office
Geological Survey, Water Resources Division
National Park Service, Hawaii Volcanoes National Park

Department of State
Bureau of Ocean and International Environmental and Scientific Affairs *

Department of Transportation
Federal Aviation Administration
Federal Highway Administration

B. STATE AGENCIES

Department of Accounting and General Services

Department of Agriculture *

Department of Budget and Finance *

Department of Hawaiian Home Lands

Department of Health

Department of Land & Natural Resources
Chair, Board of Land and Natural Resources
State Historic Preservation Division

Department of Transportation

Legislature
Representative Wayne Metcalf *

Office of Environmental Quality Control

University of Hawaii at Manoa
Institute for Astronomy

C. COUNTY OF HAWAII

Hawaii County Council
Helene Hale
Robert H. Makuakane *
Russell S. Kokubun *

Department of Parks and Recreation

Department of Planning

Department of Public Works

Department of Water Supply

Police Department

D. ORGANIZATIONS

Green Sands Community Association

Informational Network for the Spaceport

Ka`Ohana O Ka Lae

Leleiwi Community Association

Moku Loa Group, Sierra Club

Natural Resources Defense Council

E. INDIVIDUALS

Aelbert C. Aehegma
Ruth Marie Bass
Jim Dempsey *
Anthony and Margaret Dohanos
Mr. and Mrs. Duyndam--No response because there was no return address.
Jane Fellerman
Michael Gibson
Gigi Glover
Doris S. Grace
Jay Hanson
Phillip and Shirley Hixson
Mr. and Mrs. Philip C. Hoffman
Kathryn V. Jones
Diane Keffer
Keith Keffer
Michael Keller
August V. Klaue
John Langenstein
Penelope J. Langenstein
Mary E. Lighty
Stephanie Lighty
Virginia B. Macdonald
Scott & Margaret Martin
Joshua and Eva Nelson
Neicy Nelson
Rosemary North/Bjorn Linder
Diane Ocean
Linda Holmes Peebles
David C. Penn
Henry A. Ross
Mary Lou Shirai
Jim and Martha Simpson
Jim Snyder
Lani Stemmerman
Doris Thompson
Rick Vidgen
Peter A. Waldau
Jacqueline Wright

F. COMMENT LETTERS SENT TO OCST

Larry Caldwell
Lynne Chesner
Ronald D. Gordon
Hank Kline
Allesa L. Langenstein
Amy Lehua Langenstein
Thomas Langenstein
Maggie Mintz
Janice Palma

Keawe Vredenburg
Douglas K. Walsh

G. WRITTEN COMMENTS AND RESPONSES TO THE NOP

Copies of all comment letters received during the consultation period following publication of the NOP, together with the responses from DBEDT are included in the following pages. Letters to OCST and their responses follow. Letters expressing "no comment" were not answered.

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

October 25, 1989

RECEIVED

NOV 1 1989

Office of Space Industry
DBED

Mr. George W. Mead, Director
Office of Space Industry
Department of Business and
Economic Development
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Mead:

Subject: Environmental Assessment and Notice Preparation for An Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility, Ka'u District, Island of Hawaii

The above-mentioned document has been reviewed as requested. We offer the following comments for your consideration:

11-12

Site No. 1 - Palima Point
This site is subject to heavy flooding in the area shown on the enclosed map of Palima Point.

Site No. 2 - Kahilipali Point
This area is subject to high winds for up to 75 or 80 per cent of the time and has a wind erosion problem in the area indicated on the enclosed map of Kahilipali Point.

We appreciated the opportunity to review this document and would appreciate it very much if we could review the draft Environmental Impact Statement.

Sincerely,

Warren M Lee

WARREN M. LEE
State Conservationist

Enclosures - 2

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

July 9, 1993

Mr. Warren M. Lee, State Conservationist
Soil Conservation Service
Department of Agriculture
P O Box 50004
Honolulu, Hawaii 96850

Dear Mr. Lee:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 25, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments, a drainage and flooding study has been prepared for the site by Parsons Hawaii and will be included in the DEIS. Please note that the DEIS focuses on Palima Point, the preferred site.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:

October 12, 1989

RECEIVED
OCT 16 1989
Office of Space Industry
DBED

Planning Branch

Department of Business and Economic Development
Attn: Mr. George Mead
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

Thank you for the opportunity to review the Environmental Assessment and Notice Preparation (EISPN) for An Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility, Ka'u District, Island of Hawaii. The following comments are offered:

a. The EISPN indicates the presence of wetlands and anchialine ponds. A Department of the Army (DA) permit would be required for the discharge of fill material into the waters of the United States, which include wetlands and anchialine ponds. DA permits would also be required for any structures placed in navigable waters of the U.S. For more information on permit requirements, please contact the Operations Branch at 438-9258.

b. It appears the project area is located in Zone X "other areas", determined to be outside the 500-year flood plain, according to the Federal Emergency Management Agency Flood Insurance Rate Map Panels 1725 and 1850, dated September 1988.

c. Please provide us a copy of the drainage/flood study, mentioned on page 19, when it is completed. The copy should be addressed to:

District Engineer
Honolulu Engineer District
Attn: CEPOD-ED-PH
Building 230
Fort Shafter, Hawaii 96858-5440

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Copy Furnished:

CH2M Hill
Attn: Mr. John Everingham
1585 Kapiolani Blvd, Suite 1312
Honolulu, Hawaii 96814

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Colonel Ralph V. Locurcio
Division Engineer
Honolulu Engineer District
Attention: CEPOD-ED-PH Building 230
Honolulu, Hawaii 96858

Dear Colonel Locurcio:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-14

Some time ago, you offered comments (letter of October 12, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments, an inventory of marine, anchialine and sea turtle resources of the Palima Point site has been completed. Only one pond was located within the population control zone, and will not be disturbed. There are no wetlands on the site. Additionally, a drainage and flooding study has been prepared for the site by Parsons Hawaii, and will be included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Area Office - Southwest Region
2570 Dole St. - Honolulu, HI 96822

October 17, 1989 F/SWR14:JJN

NAUGHTON

Department of Business
and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

ATTENTION: Mr. George Mead

Dear Mr. Mead:

NOAA Fisheries has reviewed the Environmental Assessment (EA) and Preparation Notice for an Environmental Impact Statement (EIS), Master Plan for the Development of a Commercial Rocket Launching Facility, Ka'u District, Island of Hawaii (September 1989). It is our understanding that the proposed facility will require issuance of a license by the U.S. Department of Transportation, Office of Commercial Space Transportation (OCST) in accordance with the Commercial Space Launch Act of 1984, as amended. We offer the following comments on the EA for your consideration in preparing the joint State-Federal EIS.

General Comments

11-15 NOAA Fisheries concurs with your plans to prepare an EIS for the proposed commercial rocket launching facility. The EA describes studies to be undertaken to identify living marine resources in coastal waters of Ka'u which are of concern to this agency. We would appreciate being notified prior to your finalizing the planned qualitative and quantitative underwater nearshore biological surveys. This will allow us to assure that these studies will provide appropriate baseline data necessary for us to assess potential project related impacts to nearshore biota.

Specific Comments

Nearshore Marine Environment

Page 20, paragraph 1. In addition to potential water quality impacts from runoff, it is important to identify any proposed in-water construction or other activities within coastal waters anticipated during both the construction and operation phases of the rocket launching project.

Endangered and Threatened Species

Page 20, paragraph 2. Contrary to the first sentence in this paragraph, we know of no nesting activities by green turtles (*Chelonia mydas*) along the Ka'u coastline. However, the hawksbill turtle (*Eretmochelys imbricata*) does nest in several locations along this coast and, in fact, the small beach area at Kamehame (Palima Point site) is one of the most significant hawksbill turtle nesting sites known for the entire Hawaiian Archipelago.

NOAA Fisheries appreciates the opportunity to comment on the proposed commercial rocket launching facility project at this early stage. Please keep us informed on the development of the project EIS.

Sincerely yours,

John J. Naughton
Pacific Islands Environmental
Coordinator

cc: F/SWR, Terminal Is., CA
FWS, Honolulu
EPA, Region 9 (E-4)
Hawaii State Div. of Aquatic Resources
Hawaii CZM Program
Environmental Center, University of Hawaii - Manoa
CH2M Hill (Mr. John Everingham)

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. John J. Naughton
Pacific Islands Environmental Coordinator
National Marine Fisheries Service
Pacific Area Office, Southwest Region
2570 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Naughton:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-16 Some time ago, you offered comments (letter of October 17, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate the time that you and your staff have been willing to spend meeting with our consultants. An inventory of marine, anchialine and sea turtle resources and a study of water quality conditions at the Palima Point site has been completed and will be included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Area Office - Southwest Region
2570 Dole St. - Honolulu, HI 96822

NITTA

October 20, 1989 F/SWR14:ETN

George W. Mead
Director, Office of Space Industry
Department of Business and
Economic Development
Honolulu, HI 96804

Dear Mr. Mead:

This is in response to your request for comments on the Environmental Assessment (EA) and EIS Preparation Notice for the proposed commercial rocket launching facility in the Ka'u District on the Island of Hawaii as it relates to threatened and endangered species. Palima Point has been identified as the preferred site and Kahilipali Point as an alternate site.

The Palima Point site as envisioned includes a known hawksbill turtle (Eretmochelys imbricata) nesting area at Kamehame near the proposed location for the Delta II launch pad. Potential impacts to hawksbill turtles include alteration of nesting behavior and disorientation of hatchlings from launch area lighting at night, the effects of noise and vibration from rocket launches on egg viability and nesting behavior, and the contamination of the nesting site from fuel spills and aborted missions. There are other hawksbill nesting sites just outside of the population control zone for Palima Point at Punaluu and within the boundaries of Volcanoes National Park to the northeast. Green turtle (Chelonia mydas) foraging areas are likely distributed along the Ka'u coastline, and have been documented at Punaluu and South Point.

The EA notes that the endangered humpback whale (Megaptera novaeangliae) "transits the area but is not known to breed there". On the basis of the limited available survey data it might be more prudent to state only that humpback whales are found off the southeast coast of the island of Hawaii during the winter season, usually within the 100 fathom isobath. Their activities while in these waters have not been adequately described.

Because of the presence of these listed species and their habitats within and around the proposed project sites, a thorough reconnaissance and survey of sea turtle nesting sites should be completed so that potential impacts to sea turtle habitat from the construction and operation of the proposed launch facility can be adequately assessed in the DEIS. Although impacts to humpback whales may be negligible, the potential effects and the probabilities of affecting a few individuals should be evaluated in the DEIS as well.

The opportunity to provide comments at this early stage in the project is appreciated. We look forward to receiving the DEIS when it becomes available.

Sincerely yours,

Eugene T. Nitta

Eugene T. Nitta
Protected Species Branch

cc: CH2M Hill, John Everingham
NPS, Larry Katahira
F/SWR14, Lecky
F/SWC2, Balazs

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Eugene T. Nitta
Protected Species Branch
National Marine Fisheries Service
Pacific Area Office, Southwest Region
2570 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Nitta:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 20, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter. 11-18

We appreciate the time that you and your staff have been willing to spend meeting with our consultants. An inventory of marine, anchialine and sea turtle resources and a study on water quality conditions at the Palima Point site has been completed and will be included in the DEIS. Potential effects on humpback whales are also discussed in the document.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Scoping Comment File

Department of Energy
Washington, DC 20585
December 8, 1989

RECEIVED
DEC 11 1989
Office of Space Industry
DBED

Mr. George Mead
Executive Director
Office of Space Industry
Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Subject: U.S. Department of Transportation Notice of Intent for Preparation of an Environmental Impact Statement for a Proposed Commercial Space Launch Complex in the Ka'u District on the Island of Hawaii, State of Hawaii

Dear Mr. Mead:

In response to the Department of Transportation Notice of Intent as published in the Federal Register on Monday, September 25, 1989, [FR 54(184): 39247-39248] and an October 25, 1989, request for comments from Mr. Norman C. Bowles, U.S. Department of Transportation, we would like to make the following comment with regard to the scope and content of the EIS:

11-19

o If any domestic or foreign commercial space craft proposed for launch from this proposed commercial space launch complex envisions use of a radioisotope thermal generator (RTG) manufactured by the U.S. Department of Energy as an energy source, the EIS analysis should address normal and accidental conditions for this class of launches.

Thank you for the opportunity to comment. Please place me on the mailing list for the draft environmental impact statement and address all future National Environmental Policy Act correspondence to my office. If you have questions, please contact me at (202) 586-4600 or Jim Gilliam of my staff at (202) 586-2410.

Sincerely,

Carol Borgstrom

Carol M. Borgstrom
Director
Office of NEPA Project Assistance

cc: Mr. John Everingham, CH2M Hill
Mr. Norman C. Bowles, US DOT

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WAIHEE, Governor
MUFI HANNEMANN, Director
BARBARA KIM STANTON, Deputy Director
RICK EGGED, Deputy Director
TAKESHI YOSHIHARA, Deputy Director

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Carol M. Borgstrom, Director
Office of NEPA Project Assistance
Department of Energy
Washington, D C 20585

Dear Ms. Borgstrom:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of December 8, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter.

In response to your specific comment on the use of a radioisotope thermal generator (RTG) manufactured by the Department of Energy as an energy source for a launch vehicle, please be informed that this is specifically prohibited by Hawaii law. Section 201-75 of the Hawaii Revised Statutes, adopted on June 19, 1990, reads: "any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

United States Department of the Interior
FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS OFFICE
P O BOX 50167
HONOLULU, HAWAII 96850

ES
Room 6307
SEP 29 1989

George W. Mead, Director
Office of Space Industry
Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Re: Environmental Assessment and Notice of Preparation for An Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility, Kau District, Island of Hawaii

Dear Mr. Mead:

We have reviewed a copy of the referenced document which was forwarded to us with your letter of September 25, 1989. It appears that fish and wildlife resources within our jurisdiction will be identified and discussed in the proposed draft environmental impact statement. In addition, we wish to confirm that two candidate endangered species of plants are known to exist within the Kahilipali project area. These are Portulaca villosa (P. hawaiiensis) (category 2) and Sesbania tomentosa (category 1), as stated on page 13 of the referenced document.

We look forward to receipt of the draft statement, and will provide additional comments at that time.

Sincerely,

Ernest Kosaka
Field Office Supervisor
Environmental Services

RECEIVED
OCT 2 1989
Office of Space Industry
DBED

11-20

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WAIHEE, Governor
MUFI HANNEMANN, Director
BARBARA KIM STANTON, Deputy Director
RICK EGGED, Deputy Director
TAKESHI YOSHIHARA, Deputy Director

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Robert Smith
Field Supervisor, Fish & Wildlife Enhancement
U S Fish and Wildlife Service
Pacific Islands Office
P O Box 50167
Honolulu, Hawaii 96850

Dear Mr. Smith:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of , copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments, the DEIS focuses on Palima Point, the preferred site. A number of special surveys have been made for bird and mammal populations, and archaeological, botanical, marine (including sea turtles) and anchialine resources. These will be included as appendices to the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

TAKE PRIDE IN AMERICA

October 27, 1989

RECEIVED
OCT 30 1989
Office of Space Industry
DBED

Mr. George W. Mead
Director, Office of Space Industry
State of Hawaii
Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

The staff of the Hawaii District, Water Resources Division, U.S. Geological Survey has reviewed the Environmental Assessment and Notice Preparation for the Development of a Commercial Rocket Launching Facility within the Ka'u District of the Island of Hawaii, and we have the following comments:

11-21

The Environmental Impact Statement should address the monitoring strategy for the air, ground-water, anchialine, and ocean environments, during and after construction of the proposed commercial launching facility.

Information from existing wells near the Palima Point site support the statement that ground water is sufficiently abundant to meet expected water requirements. We are not aware of information that would support that statement for the Kahilipali Point site. We would expect the ground water availability at the Kahilipali site to be much less than at the Palima site.

We agree that the risk posed by volcanic activity is less at the Kahilipali site than at the Palima site.

Thank you for the opportunity to review this environmental assessment.

Sincerely,

Charles J. Ewart
Acting District Chief

cc: Mr. John Everingham, CH2M Hill, 1585 Kapiolani Blvd., Suite 1312, Honolulu, Hawaii 96814

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. William Meyer, District Chief
Water Resources Division
U S Geological Survey
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 27, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. The DEIS focuses on Palima Point, the preferred site. Surveys of groundwater and ocean resources and anchialine ponds at Palima Point have been completed and will be included as appendices to the DEIS. An assessment of existing ambient air quality and a detailed analysis of potential impacts and mitigating measures have also been completed and will be included.

2. A monitoring strategy for all areas of environmental concern will be developed as part of the permitting process when there are specific construction plans for the proposed facility.

3. Reports on the seismic activity of the area and a hazard assessment of inundation of the site by lava flows have also been prepared and will be included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

JOHN WAIHEE
Governo
MUFI HANNEMANN
Directo
BARBARA KIM STANTON
Deputy Directo
RICK EGGER
Deputy Directo
TAKESHI YOSHIHARA
Deputy Directo

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2404 Fax (808) 586-2377

July 9, 1993

Mr. Hugo H. Huntzinger, Superintendent
Hawaii Volcanoes National Park
National Park Service
P O Box 52
Honolulu, Hawaii 96718

Dear Mr. Huntzinger:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 2, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate the time that you and your staff have been willing to spend meeting with our consultants on air quality, noise, lighting, archaeology, birds and mammals, toxicology and ocean recreation to assist us in the development of the DEIS. Through our joint efforts, we believe that the errors in the environmental assessment which you identified in your department's letter have been corrected.

A number of special surveys have been made of Palima Point, the preferred site. The surveys include bird and mammal populations, and archaeological, botanical, marine (including sea turtles) and anchialine resources. Also, an assessment of existing ambient noise levels and a detailed analysis of potential impacts and mitigating measures have been completed. These studies will be included as appendices to the DEIS.

Your concerns about preservation of open space and the impacts of increased human activity are also fully addressed in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

RECEIVED

NOV 14 1989

Office of Space Industry
DBED

November 6, 1989

Mr. George Mead
Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96814

Dear Mr. Mead:

Thank you for giving us the opportunity to review the EIS proposal to establish a commercial space launch facility in the Ka'u District.

We find that the proposed action does not appear to have any adverse impact on the foreign relations of the United States, nor on international environmental issues. The Department of State therefore does not need to comment on the project.

Sincerely,

Deborah M. Odell
Office of Ecology, Health
and Conservation

cc: Mr. John Everingham
CH2M Hill
1585 Kapiolani Boulevard
Suite 1312
Honolulu, Hawaii 96814

Mr. Norman C. Bowles
Associate Director for Licensing Programs
Office of Commercial Space Transportation
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

U.S. Department of Transportation
Federal Aviation Administration

800 Independence Ave., S.W.
Washington, D.C. 20591

21

RECEIVED
NOV 27 1989
Office of Space Industry
DBED

Mr. George Mead
Department of Business
& Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

The Office of Commercial Space Transportation, United States Department of Transportation, asked that we provide our views as to the scope and content of an environmental impact statement (EIS) for the proposed commercial spaceport on the island of Hawaii. We have reviewed the environmental assessment (EA) and notice of intent which was provided for our information and have the following two comments:

Part IV of the EA deals with some potential environmental impacts and mitigating measures, i.e., the endangered and threatened species and terrestrial flora and fauna sections. The EIS should state the mitigation measures, appropriate agencies responsible for implementation, and future monitoring, if necessary.

The alternative section of the EIS should address and discuss the range of alternatives that meet the "underlying need." In this case, the "underlying need" is establishing a commercial space launch facility in the Ka'u district on the island of Hawaii.

Thank you for the opportunity to present our views for the proposed subject EIS.

Sincerely,

J. E. Densmore
Director, Office of Environment
and Energy

Enclosure

cc: CH2M Hill, Attn: Mr. John Everingham

JOHN WAIHEE
Governo
MUFI HANNEMANN
Directo
BARBARA KIM STANTON
Deputy Directo
RICK EGGERT
Deputy Directo
TAKESHI YOSHIHARA
Deputy Directo

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. J. E. Densmore, Director
Office of Environment and Energy
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

Dear Mr. Densmore:

11-28

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of November 21, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. A number of special surveys have been made of Palima Point, the preferred site. The surveys include bird and mammal populations, and archaeological, botanical, marine (including sea turtles) and anchialine resources. These will be included as appendices to the DEIS. Assessments of existing ambient air quality and noise levels have also been made. A detailed analysis of all potential impacts and recommendations for mitigating measures have been completed and will be included.

2. Action alternatives, including the "no action" alternative, is addressed in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE

ARIZONA
CALIFORNIA
NEVADA
HAWAII
GUAM
AMERICAN SOMOA
N. MARIANA IS.

RECEIVED
NOV 16 1989
Office of Space Industry
DBED

November 14, 1989

IN REPLY REFER TO

HPP-09

Mr. George Mead
Executive Director, Office of Space Industry
Hawaii Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

The Federal Highway Administration (FHWA) has reviewed the September 25, 1989 Federal Register notice of intent and the September 1989 environmental assessment (EA) for the preparation of an environmental impact statement (EIS) for the Development Master Plan of a Commercial Rocket Launching Facility in the Ka'u District of the Island of Hawaii, Hawaii. The following comments are provided.

11-29 **Highway Safety**

1. In general, the existing two-lane State Highway 11 (SH 11) consists of a 24-foot wide roadway. However, there are sections between the Hilo airport/harbor facilities and the project sites under study where the roadway is only 20 feet wide: mile posts (MP) 31 to 37 and 46 to 63. The town of Pahala is in the vicinity of MP 51 and the town of Na'alehu is near MP 64. These are the approximate access points to the two proposed commercial space launch complexes.

   We are concerned with the public highway safety effects of increased truck traffic on these narrow highways during both project construction and facility operation, particularly from oversized truck and trailer vehicles. The draft EIS will need to include a discussion of highway geometrics and safety that (a) describes and refers to a figure which depicts the various roadway features (e.g., lane and shoulder widths, turning lanes, bridge widths and lengths, horizontal and vertical clearances, roadway alignment curvatures, and design and operating speeds) along the public highway route(s) that will be used by truck and trailer vehicles between the Hilo airport/harbor and the rocket launching site, (b) identifies the length, width, height, minimum turning radius, and wheel path of the loaded truck and trailers that will be traveling on public roads during the various phases of project construction and operation, (c) provides the frequency, days,

Cont. →

   volumes. Project mitigation, such as providing additional highway capacity improvements, need to be identified.

Mr. Al Benet in our Hawaii Division Office in Honolulu is the FHWA contact for project activities on the Island of Hawaii. Should you have any questions regarding the above comments or the FHWA concerns with the proposed project, please contact Mr. Benet by telephone: (808) 541-2700, or by correspondence: Mr. William R. Lake, Division Administrator, Federal Highway Administration, Box 50206, Honolulu, Hawaii 96850.

We appreciate this opportunity to review the subject notice of intent and environmental assessment. Please send two copies of the draft EIS to this office when it becomes available.

Willis Kisselburg Jr.
Willis Kisselburg, Jr.
Director, Office of Planning
and Program Development

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGERT
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. William R. Lake
Division Administrator
Federal Highway Administration
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Lake:

11-30

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of November 14, 1989 from Mr. Willis Kisselburg, Jr., Director of the Office of Planning and Program Development for Region Nine, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your department's letter.

We appreciate the time that you and your staff have been willing to spend meeting with our staff and consultants on this project. The study prepared by Barton Aschman addressing existing highway conditions and traffic, planned highway improvements, and projected traffic impacts will be included in the DEIS.

Because the launch vehicles will be transported to the proposed facility from the Port of Hilo and within the complex without propellants or additional components (which will be vertically assembled at the launch pad), loads on roadway surfaces are expected to be relatively light. The facility requirements study prepared for the Conceptual Plan assumes the largest transporter to be 80 feet in length and the maximum load to be 60 tons.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

RUSSEL S. NAGATA
COMPTROLLER

JAMES H. YASUDA
DEPUTY COMPTROLLER

LETTER NO. (P)1982.9

OCT 6 1989

RECEIVED
OCT 1 3 1989
Office of Space Industry
DBED

Mr. George Mead
Director
Office of Space Industry
Department of Business and
Economic Development
State of Hawaii
Honolulu, Hawaii

Dear Mr. Mead:

Subject: Commercial Rocket Launching Facility
EIS Preparation Notice

Thank you for the opportunity to be consulted on the subject document. We have the following comments to offer:

1. The EIS Preparation Notice makes reference to other documents containing more detailed information. We recommend that some of that information be included in the EIS. For example:

   a. The reader is directed to another report where "sites...were evaluated...to launch vehicles...with safety". The EIS reader does not know what these safety evaluations were.

   b. Mention is made of "hazard corridors", and "safe" flight paths which do not impact population areas, but no drawings showing these are provided.

   c. Noise modeling is mentioned as part of "further studies".

2. The impacts of the launch activities on Kau High and Pahala Elementary Schools, which are located in Pahala close to the Palima Point site, should be discussed in the EIS. These impacts should include:

   a. Effects of early flight terminations. Show the flight paths.

   b. Noise during launch. The text shows expected noise levels at the site boundary exceeding the typical annoyance threshold.

   c. Release of toxic substances into the atmosphere. The text says that operations that pose such risks will be conducted only when meteorological conditions "favor" "rapid" dispersion to below toxic levels and that air quality will be monitored. What safety measures will be provided for an unexpected toxic cloud release due to an accident?

   d. Site access. The text says that vehicular access to the site would be via State Highway 11. Since this highway passes immediately adjacent to Pahala and is the only ingress and egress route to Pahala, what is the effect of a toxic substance spill on the highway to Pahala residents and access to the town?

Should there be any questions, please have your staff contact Mr. Cedric Takamoto of the Planning Branch at 548-7192.

Very truly yours,

TEUANE TOMINAGA
State Public Works Engineer

CT:em
cc: Mr. John Everingham
Mr. Eugene Imai
Mr. Kaoru Higaki
Dr. Marvin Miura

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Teaune Tominaga
State Public Works Engineer
Division of Public Works
Department of Accounting & General Services
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Tominaga:

11-32

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 10, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. The DEIS will include a summary of the safety assessment prepared by the federal Office of Commercial Space Transportation and additional analyses that have been made. It will also include illustrative drawings that will indicate launch flight paths and the locations of launch vehicle stage impacts. Noise impacts have been modeled and the complete report will be appended to the DEIS.

2. Potential impacts on all areas that may be affected by some aspect of a launch will be evaluated. These will include impacts of noise on schools, residences, and other surrounding areas. Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire and explosion. The accident scenarios include incidents involving transportation, storage, and handling and launch operations.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

November 13, 1989

RECEIVED
NOV 17 1989
Office of Space Industry
DBED

Mr. George W. Mead, Director
Office of Space Industry
Department of Business and Economic Development
250 South King Street
Honolulu, Hawaii 96804

Dear Mr. Mead:

Subject: Environmental Assessment
Commercial Rocket Launching Facility
Palima Point and Kahilipali Point
Ka'u, Hawaii
TMK: 9-4 and 9-5

The Department of Agriculture has reviewed the subject Assessment and has no comments to offer at this time. We note that the Draft Environmental Impact Statement (EIS) will address impacts on existing and potential agriculture in the affected areas.

Please send us a copy of the Draft EIS when it is available.

Thank you for the opportunity to comment.

Sincerely,

Yukio Kitagawa
YUKIO KITAGAWA
Chairperson, Board of Agriculture

cc: CH2M Hill
OEQC

JOHN WAIHEE
GOVERNOR

EMPLOYEES' RETIREMENT SYSTEM
HAWAII PUBLIC EMPLOYEES HEALTH FUND
OFFICE OF THE PUBLIC DEFENDER
PUBLIC UTILITIES COMMISSION

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
STATE CAPITOL
P.O. BOX 150
HONOLULU, HAWAII 96810-0150

YUKIO TAKEMOTO
DIRECTOR

ROBERT P. TAKUSHI
DEPUTY DIRECTOR

THOMAS L. YAMASHIRO
DEPUTY DIRECTOR

DIVISIONS:
BUDGET, PLANNING AND MANAGEMENT
ELECTRONIC DATA PROCESSING
FINANCE
TELECOMMUNICATIONS

October 4, 1989

RECEIVED
OCT - 9 1989
Office of Space Industry
DBED

Mr. George W. Mead, Director
Office of Space Industry
Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

Thank you for the opportunity to comment on your Environmental Assessment and Notice Preparation for an environmental impact statement for the development of a commercial rocket launching facility on the Big Island.

We have no comments to make at this time.

Sincerely,

YUKIO TAKEMOTO

cc: Mr. John Everingham
CH2M Hill

JOHN WAIHEE
GOVERNOR
TATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

ILIMA A. PIIANAIA
CHAIRMAN
HAWAIIAN HOMES COMMISSION

October 11, 1989

MEMORANDUM

TO: George W. Mead, Director
Office of Space Industry
Department of Business and Economic Development

FROM: Ilima A. Piianaia, Chairman
Hawaiian Homes Commission

SUBJECT: Commercial Rocket Launching Facility, Ka'u District, Hawaii

Thank you for providing us with a copy of your Environmental Assessment and Notice Preparation for An Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility, dated September 1989.

At this stage, we have no specific comments other than an expressed concern that your Kahilipali Point site option does impact considerably on Hawaiian home lands at Kamaoa. Compensation issues to the Hawaiian home lands trust will need to be satisfactorily addressed if this site is selected.

Please keep us informed, and if we can provide any assistance in the preparation of the EIS, please contact us. Thank you for the opportunity to comment.

IAP:HS:mi

11-34

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Hoaliku L. Drake, Chair
Hawaiian Homes Commission
P O Box 1879
Department of Hawaiian Home Lands
Honolulu, Hawaii 96805

Dear Ms. Drake:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, your department offered comments (letter of October 11, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your department's letter. In response to your specific comments, the DEIS focuses on the preferred site, Palima Point, which does not encompass any Hawaiian Home Lands.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

RECEIVED
DIRECTOR'S OFFICE
Nov 6 1 49 PM '89
BUSINESS DEVEL.

In reply, please refer to:
EPHSD

November 1, 1989

MEMORANDUM

TO: The Honorable Roger A. Ulveling, Director
Department of Business and Economic Development

FROM: Director of Health

SUBJECT: ENVIRONMENTAL ASSESSMENT AND NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT FOR A MASTER PLAN FOR THE DEVELOPMENT OF A ROCKET LAUNCHING FACILITY KA'U DISTRICT, ISLAND OF HAWAII

Thank you for the opportunity to review the subject document. We have examined the environmental assessment and have the following comments to offer:

Air Quality Impacts

The environmental assessment identifies three scenarios where the launching activities may impact the air quality. These scenarios include emission impacts resulting from a normal launch, a propellant spill or explosion, and an in-flight termination of a rocket launch. An air quality impact analysis evaluating each scenario should be included as an appendix to the environmental impact statement. The analysis

should be of sufficient detail not only summarizing the results but also describing the computer models and the associated emission rates and the meteorological conditions utilized in the analysis. With the worst case results, a risk assessment on the nearby residents should be conducted.

An ambient air quality and meteorological monitoring plan should also be included as an appendix to the environmental impact statement. The plan should present the extent of the monitoring network and the parameters to be monitored. In addition, the plan should explain how the data will be processed and used in dictating the operations at the facility to minimize potential air quality impacts.

Safe Drinking Water

1. The environmental assessment indicates that the facility will have its own potable water system. If this water system is to serve 25 or more individuals at least 60 days per year or will have a minimum of 15 service connections, the applicant will be required to comply with the Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems."

2. The assessment also states that wells would be developed on site to satisfy potable water needs. Section 11-20-29 of Chapter 20 requires that a new source of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.

3. Section 11-20-30 of Chapter 20 requires that new or substantially modified distribution systems for public water systems be

approved by the Director of Health. This approval is contingent upon the submission of plans, specifications, and other supporting documents for the Department's review, prior to commencing construction. The system must be designed to assure that the new or modified portions of the system are capable of delivering potable water in compliance with the maximum contaminant levels set in Chapter 20.

Underground Injection Control (UIC)

1. Potable water wells to be constructed for this project should be sited above the UIC line.

2. Ground disposal of domestic wastewater should be conducted below the UIC line whenever possible. Injection wells for the disposal of wastewater will not be permitted above the UIC line.

3. All injection wells for this project including wastewater injection wells and rainfall runoff water injection wells (drywells) must have a UIC permit to operate.

4. Palima Point Site:

   Proposed Pads 1, 2, 3 and 4 are located above the UIC line.

5. Kahilipali Point Site:

   Proposed Pads 1 and 2 are below the UIC line.
   Proposed Pads 3 and 4 are approximately on the UIC line.
   Future Expansion Pad site is generally below the UIC line.

Hazard Evaluation and Emergency Response

The EIS should disclose all the potential risks associated with the potential hazards associated with the storage and use of extremely hazardous substances that are proposed for use at the facility.

In order to meet this disclosure, we recommend that the EIS include all the information that is reasonably projected to be required under the Emergency Planning and Community Right-to-Know Act of 1986. This should include a hazard analysis which is described in the law, regulations and supporting federal technical documents entitled: Technical Guidance for Hazards Analysis and the supplemental Handbook of Chemical Hazard Analysis Procedures available from the Federal Emergency Management agency.

The fuels that are proposed for use at this facility are similar if not the same as those that caused an unprecendented explosion at the rocket fuel production facility at Henderson, Nevada. Careful emergency planning will only help to prepare the State and County of Hawaii for the prevention of and preparedness for a chemical emergency at this proposed facility.

Hazardous Waste

Under the heading of 'Wastewater Collection and Treatment' (Page 8 of the EANP), several vague statements were found which should be clarified. Mention is made that "no industrial waste, including toxic waste, would be disposed through the onsite systems without adequate pre-treatment." Mention is further made that "the quantity of hazardous waste generated by routine operation is expected to be small. If such wastes are generated, appropriate handling and temporary storage will be required before shipping to the mainland U. S. for

disposal by a licensed contractor." The environmental impact statement for the proposed facility should include the following:

1. The specific types of hazardous waste (e.g., hydrazine, halogenated solvents, etc.) which may possibly be generated along with a listing of all hazardous constituents and any Chemical Abstract Service Registry Numbers (CASRNs);

2. The respective quantities of each potential hazardous waste which may be generated at the proposed facility;

3. Where each respective hazardous waste will be generated on site; and

4. Where each respective hazardous waste will be treated/stored/disposed both on-site and off-site.

Persons who generate, transport, treat, store and/or dispose of hazardous wastes must notify the U. S. Environmental Protection Agency (EPA) of all hazardous waste activities pursuant to Section 3010 of the Resource Conservation and Recovery Act (RCRA), as amended, and comply with applicable regulations as found in Title 40 of the Code of Federal Regulations (CFR) Parts 260 through 270.

Furthermore, treatment (and this includes pre-treatment), storage and/or disposal (TSD) of any hazardous waste is subject to permitting regulations found in 40 CFR Part 270. Also, since the facility is located in a seismically active area, any application for a RCRA TSD permit must demonstrate compliance with 40 CFR 264.18.

Releases of hazardous waste or hazardous waste constituents to the environment from the proposed facility may be cause for implementing

corrective action activities under Sections 3004 and 3008 of RCRA, as amended.

The EANP provides trade names for propellants that will be used by the candidate launch vehicles (page 18). The environmental impact statement for the proposed facility should also provide the specific chemical names, chemical constituents and CASRNs for these trade name products.

In addition, the environmental impact statement should assess the impact on human health (both on-site and off-site) of hazardous waste and hazardous constituents generated or handled on site. This assessment should include how potential hazardous waste management areas would affect water supply wells projected for on-site development.

Solid Waste

The subject EANP does not address the generation and/or disposal of solid waste. The environmental impact statement should specifically describe all solid waste handling activities for the proposed facility. Should a solid waste landfill facility be planned for the proposed site, a permit must be obtained from the Department of Health and, at a minimum, must be designed to prevent leachate migration to the anchialine ecosystems and ground waters. Also, we strongly recommend that any solid waste landfill facility be sited below the underground injection control line.

Used Oil Transport and Disposal

The proposing agency should realize that used oils (which includes fuel oils and hydraulic oils) are regulated by Chapter 342-N 'Used Oil Transport, Recycling and Disposal.' This statute states that new or used oil cannot be discharged into the municipal wastewater treatment system, storm drains, surface or ground waters, or marine waters. In addition, new, used or recycled oil cannot be disposed of onto the ground (either directly or surface runoff) without approval by the Department of Health and the landowner.

Solvent contamination of used oils may cause used oils to exhibit hazardous waste characteristics and thus, be subject to federal regulation as a hazardous waste in accordance with 40 CFR Parts 260 through 270. Therefore, it is strongly recommended that separate collection, storage and disposal/recycling systems for used oils and solvents be implemented at the proposed facility to prevent solvent contamination of the used oils.

During the construction phase of the proposed project, provisions should be made to properly collect and dispose of used oils and solvents from equipment operations.

Generation, storage, transport, recycling and/or disposal of used oils during the operational phase of the proposed facility should be fully addressed in the environmental impact statement.

Lead Acid Batteries

The EANP does not address the disposal of lead acid batteries at the proposed facility. Chapter 342-I, 'Lead Acid Battery Recycling' of the Hawaii Revised Statutes states that "No person may place a used lead

acid battery in mixed municipal solid waste, discard, or otherwise dispose of lead acid battery except by delivery to an automotive battery retailer or wholesaler, to an authorized collection or recycling facility, or to a secondary lead smelter permitted by the United States Environmental Protection Agency."

The environmental impact statement for the proposed facility should address the disposal and/or recycling of such batteries at the facility. In the event of battery recycling, it is strongly recommended that the electrolyte remain in the battery when taken to a recycling facility.

Underground Storage Tanks (USTs)

The EANP states that facilities on the site would consist of launch pads, roads, tracking equipment, utilities, an operations control center, a pay load and vehicle processing area, an industrial area, and fuel storage areas (page 4). These types of facilities and activities may include the installation of USTs for the purposes of storing motor fuel, waste oil and hazardous substances.

The proposing agency should realize that these USTs may be subject to both federal UST rules and regulations as found in Title 40 of the Code of Federal Regulations (CFR) Part 280 (Attachment A), and State requirements in accordance with the Hawaii Revised Statutes Chapter 342-L 'Underground Storage Tanks' (Attachment B).

Due to the proposed locations of the facility, the permeability of the volcanic type soils and bedrock, and the proposed development of water wells on-site, it is strongly recommended that UST systems installed on the facility employ secondary containment with an appropriate leak detection method, in addition to other federal UST requirements.

Lastly, the installation of UST systems that contain flammable and combustible liquids are subject to regulation by the County of Hawaii. Prior to UST installation, the appropriate Fire Department should be contacted regarding any county requirements governing UST systems that may exist.

Groundwater Protection

In a recent magazine advertisement, the manufacturer of a synthetic geo-membrane for surface impoundments explained how his product helped the space shuttle program to prevent groundwater contamination. The advertisement explained how the shock forces generated at lift-off by the engines of large launch vehicles were responsible for structural damage to pad facilities. In order to dampen these forces and protect the structural integrity of the launch pad, massive quantities of water had to be pumped onto the platform during the lift-off sequence. The water was subsequently collected in a concrete-lined surface impoundment and stored for eventual treatment and disposal.

The problem of groundwater contamination occurred when the wastewater began leaching through the concrete-lined impoundment. Subsequent investigations revealed that the corrosivity of the wastewater was caused by the interaction of water and spent rocket fuel, and that this mixture was capable of dissolving even concrete. The manufacturer of the geo-membrane successfully corrected the incompatibility problem by installing a chemically inert liner that resisted the corrosive effects of the wastewater.

If the proposed rocket launching facility utilizes a water damping system similar to the one described above and a surface impoundment must be constructed to store and treat the wastewater, we recommend that the impoundment be lined with material that is chemically and

physically compatible (i.e., nonreactive) with the characteristics of the wastes being generated.

JOHN C. LEWIN, M.D.

cc: DOH, Hawaii

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:

February 26, 1992 91-455/epo

TO: The Honorable Murray E. Towill, Director
Department of Business, Economic Development and Tourism (DBEDT)

FROM: John C. Lewin, M.D. *Bruce K. Anderson for*
Director of Health

SUBJECT: Department of Health Policies or Opinions Relating to the Space Program in the Ka'u District, Island of Hawaii

Recently, you asked me for information regarding the above subject. On November 1, 1989, in a memo to Mr. Roger Ulveling, the past director of DBEDT, we reviewed, stated our concerns, and made suggestions to an Environmental Assessment and Notice of Preparation of an Environmental Impact Statement (EIS) for a Master Plan for the Development of a Rocket Launching Facility, Ka'u District, Island of Hawaii. Also, on September 26, 1990, in a letter addressed to Mr. Randy Gallien, we commented on the Revised Preliminary Final Environmental Assessment for the Strategic Target Systems (STARS) on the Island of Kauai.

Our comments and concerns are still relevant to the space program today. Both letters are enclosed for your information. The only additional comments that we would make at this time are the following:

1. That a contingency plan be included in the EIS for implementation in case there is a spill or an explosion of hazardous materials.

2. The EIS should disclose the extent of heavy metal and corrosive releases expected from normal atmospheric flight operations.

Enc.

c: Solid and Hazardous Waste Branch
Hazardous Evaluation and Emergency Response Office

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

The Honorable John C. Lewin, M. D., Director
Department of Health
P O Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

1141

Some time ago, you offered comments (letter of November 1, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate the time that your staff have been willing to spend meeting with our consultants to assist us in the development of the DEIS. In response to your specific comments:

1. An assessment of existing ambient air quality and meteorological conditions was completed. To this end, dispersion of the exhaust plume produced by normal launches under eight different weather conditions was modeled. A detailed analysis of all potential impacts and recommendations for mitigating measures have been completed and will be included in the DEIS. Please note that the DEIS focuses on Palima Point, the preferred site.

2. A study on groundwater resources and the potential impacts on groundwater from accidental spills and unburned fuel from an accidental explosion has been completed and will be included in the DEIS.

3. The transportation, storage and handling of hazardous materials and emergency measures are discussed at length in the DEIS. Accident scenarios have been

developed and a hazard assessment performed for releases of toxic substances, fire and explosion. The accident scenarios include incidents involving transportation, storage, handling and launch operations. Both a health risk assessment and an ecological risk assessment have been completed for normal activities and launch anomalies.

4. The construction of the launch facility would be undertaken by a corporation or consortium which will be required to comply with all state laws and regulations regarding solid and hazardous wastes, used oil transport and storage, lead acid batteries and underground storage tanks.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

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AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
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CONSERVATION AND RESOURCES ENFORCEMENT
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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:VIN

FILE: 90-208
DOC.: 6892E

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GOVERNOR'S OFFICE
BUSINESS ... DEVELOPMENT

MEMORANDUM

TO: The Honorable Roger A. Ulveling, Director
Department of Business and Economic Development

ATTN: Mr. George W. Mead, Director
Office of Space Industry

FROM: William W. Paty, Chairperson
Board of Land and Natural Resources

SUBJECT: To Establish a Commercial Rocket Launching Facility in the Ka'u District on the Island of Hawaii.

Thank you for giving our Department the opportunity to comment on this matter. We have reviewed the materials you submitted and have the following comments.

Our records indicate that you already have the comments of our Division of State Parks/Historic Sites.

In addition, the Draft EIS should describe the existing aquatic resources within the project area and identify those that may be affected by the proposed activity. Mitigation measures should be provided to protect the marine life and prevent excessive adverse impacts.

The EIS also should discuss all restrictions or limitations that may be expected during construction and operation of the facility, which might affect traditional public access to and along the shore, and possibly interfere with fishing, camping and other public recreational activities. Native gathering rights shall not be curtailed, nor shall any curtailment of shoreline recreation be allowed.

Additional concerns reflect potential adverse impacts to commercial and recreational fishermen who may be restricted from their year-round traditional fishing grounds near the offshore Fish Aggregation Buoys by "caution corridors" during launching or countdowns. Additionally, shoreline modifications or in-water construction, that may be necessary at or near the launch site, should be described in detail in the EIS.

We also suggest that the applicant provide information on the precautions or mitigation measures that would be taken to prevent petroleum products, eroded material, debris, cement by-products and other contaminants associated with construction of a launch site from impacting the aquatic environment, especially during storm runoff.

Potential adverse impacts to threatened and endangered marine species within the project area should also be discussed and potential impacts mitigated.

The matter of hazardous wastes is a deep concern. There should be absolute assurances that there will be no contamination of ground water reserves or of offshore waters. We also have concerns about the "appropriate handling and temporary storage" of hazardous wastes generated by routine operation. The transport of such matter is planned to be via state highway, through communities, agricultural land, and a national park, and very near state forest reserve and natural area reserve lands. Again, absolute assurances are necessary.

Transport and storage of fuels and propellants also should be addressed, and also the threat of fire. Proposed sites are in windswept areas dominated either by lava fields or grassy/brushy vegetation. Major fires in the area could pose a threat to the communities of Naahelu and Pahala, as well as agricultural fields and Hawaii Volcanoes National Park.

Another matter to be addressed is what effect each launch is likely to have on the atmospheric layer above the launch site and what effect that has, in turn, on the surface beneath.

Also required are descriptions of the effects of this development on the people of the Ka'u District, how this proposal affects residents socially, economically, and physically.

Also, the EIS should contain the results of a botanical survey to be conducted on and around each prospective site. Additionally, we would expect to see a discussion of the possible impacts from a botanical standpoint, at a regional level: within the District of Ka'u there are vast areas of healthy, native forest within state forest reserves, which includes individual plants of, and habitat for, the endangered Hawaiian vetch, Vicia menziessii. The applicant also should address the possible hazards and impacts to these (typically upland) areas, even though these areas are somewhat removed from the launch sites.

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

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EDWARD Y. HIRATA
DIRECTOR

DEPUTY DIRECTORS
JOHN K. UCHIMA
RONALD N. HIRANO
DAN T. KOCHI
JEANNE K. SCHULTZ

IN REPLY REFER TO:
HWY-PS
2.9063

NOV 2 1989

MEMORANDUM

TO: Mr. Roger A. Ulveling, Director
Department of Business and Economic Development

Attention: Mr. George W. Mead

FROM: Director of Transportation

SUBJECT: ENVIRONMENTAL ASSESSMENT/PREPARATION NOTICE
COMMERCIAL ROCKET LAUNCHING FACILITY
KA'U DISTRICT, ISLAND OF HAWAII

Thank you for your letter of September 25, 1989, requesting our review of the subject project. Our comments are as follows:

1. A traffic assessment report should be prepared for our review and approval. The report should discuss the volumes and type of traffic to be generated during the construction and operation of the launching facility.

2. The EA should provide a discussion of the site's access with FAP route no. 11.

3. A Drainage Report should be prepared for our review. It should discuss the problems of occasional road flooding on Route 11 during the rainy season.

4. The EA should address operational procedures to assure protection of the general public from the accidental release of liquid fuel propellants incidental to transporting this fuel from Hilo to the launching facility. Other hazardous materials to be used in the entire operation of the facility need to be identified in the EIS.

5. Construction work to be done within the state highway rights-of-way requires plan submittal and our approval. All costs incurred for this work shall be borne by the developer.

Edward Y. Hirata

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

The Honorable Rex D. Johnson, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of November 2, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. We appreciate the time that the Department has been willing to spend meeting with our consultants on this project. The study prepared by Barton Aschman addressing existing highway conditions and traffic, planned highway improvements and projected traffic impacts will be included in the DEIS.

2. The Conceptual Plan for the proposed facility at Palima Point provides for two places of access from Route 11. These will be built to State Department of Transportation specifications.

3. A drainage and flooding study has been prepared for the site by Parsons Hawaii. They will be included in the DEIS.

4. Hazardous materials and operational procedures for transport, handling and storage of propellants and other hazardous materials are discussed in the DEIS.

5. The DEIS is based on the Conceptual Plan and Project Description (Office of Space Industry, 1993). The actual construction will be done by a corporation or consortium which will be required to comply with all state laws and regulations.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Speaker
DANIEL J. KIHANO
Vice Speaker
EMILIO S. ALCON
Minority Leader
TOM OKAMURA
Minority Floor Leader
PETER K. APO

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2nd — HARVEY S. TAJIRI
3rd — WAYNE METCALF
4th — DWIGHT Y. TAKAMINE
5th — VIRGINIA ISBELL
6th — MIKE O'KIEFFE
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19th — ED BYBEE
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22nd — FRED HIRAYAMA
23rd — BARBARA MARUMOTO
24th — FRED HEMMINGS, JR.**
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33rd — ROD TAM
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50th — EZRA R. KANOHO
51st — BERTHA C. KAWAKAMI

*Minority Leader
**Minority Floor Leader

HOUSE OF REPRESENTATIVES
THE FIFTEENTH LEGISLATURE

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

October 19, 1989

RECEIVED
OCT 1 1989
Office of Space Industry
DBED

George W. Mead
Director, Office of Space Industry
Department of Business and Economic Development
Kamamalu Building
250 South King Street
Honolulu, Hawaii 96813

Dear Mr. Mead:

I acknowledge the receipt of and thank you for a copy of an environmental assessment of an Environmental Impact Statement for the development of a Commercial Rocket Launching Facility in the Ka'u District.

With warm personal regards.

Sincerely,

WAYNE METCALF
Chairman
House Committee on Judiciary

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
465 SOUTH KING STREET, ROOM 104
HONOLULU, HAWAII 96813

MARVIN T. MIURA, Ph.D.
DIRECTOR

TELEPHONE NO.
548-6915

September 27, 1989

RECEIVED
OCT - 3 1989
Office of Space Industry
DBED

Mr. George Mead
Department of Business and Economic Development
Office of Space Industry
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

SUBJECT: Comments on Preparation Notice for Commercial Rocket Launching Facility Master Plan

We have reviewed your preparation notice for this project and offer the following comments for your consideration:

- The land owners of the two potential launching sites should be notified of the project so that they may provide input at this early stage of the project's development.

- The environmental assessment indicates that the initial launch rate for small rockets will be one to five per year; this will increase to between six and ten launches per year when the larger pads are constructed. By 2003, the number of launches may be as much as 20 and 35 per year.

  At the lower launch rate of ten per year, the use of so much land for a spaceport facility seems unjustifiable; at the higher rate of 35 launches per year, it is difficult to imagine that there would be this great a demand, especially since the payload would be limited to a maximum of 5,200 pounds, there are other launch facilities worldwide with more planned, and the complexity of satellites limit their construction to only a few per year. Please note that the Delta rocket which has been in operation since 1960 has transported only about 170 payloads, an average of about six launches per year for this class of rocket. Your economic feasibility analysis should address this issue in detail.

- Hawaii is being considered as a launch facility because of its polar as well as its equatorial launch capability. However, rocket, fuel, and payload must be shipped to Hawaii over great distances somewhat negating this advantage. It seems that any desolate location fairly close to an industrial center could compete as a launch facility. Please discuss other locations where launch facilities are located or planned.

- Shipment of rocket fuel posses a great fire and explosive hazard. Since there are no harbor facilities at the proposed launch sites, we assume that the fuel will be off-loaded at Hilo and trucked to the proposed launch facilities. This will greatly increase the probability of an accident. This danger and possible mitigation measures should be discussed. Also, if shipment of rocket fuel will be made indirectly to Hilo through Honolulu, this should be disclosed.

- The safeguards for fuel and hazardous chemical storage facilities should be discussed in detail. Safeguards should include fire, explosion, and spill containment. Also, prevention or containment of toxic fumes should be discussed.

- The types and quantities of hazardous wastes produced by the facility should be discussed. The environmental assessment discloses that 100,000 gallons of water contaminated with hazardous materials may be generated. An additional 100,000 gallons of contaminated water could also result in an emergency wash-down.

- The population control zone encompasses a large area. Since rockets will be launched at a rate of less than one every two weeks, shoreline access for residents should be considered. Presenlty, there is hiking, shoreline fishing, limu gathering, and opihi picking at the two proposed sites. A means of preventing shoreline access only during launch days could be devised.

Thank you for providing us this opportunity to comment on your project.

Sincerely,

Marvin T. Miura, Ph.D.
Director, Office of Environmental Quality Control

Roy Sakamoto
Environmental Technical Specialist

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 17th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of September 27, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. The DEIS focuses on the preferred site, Palima Point. There has been communication with all landowners.

2. The amount of land required for the facility and the Population Control Zone is a function of safety requirements, regardless of the number of launches.

3. This is true. Other locations have been discussed and promoted including Australia, Indonesia and Alaska, among others. Currently, the only operating commercial satellite launching facility in the world is in Kourou, French Guiana.

4. Accident scenarios have been developed and a hazard assessment has been performed for releases of toxic substances, fire, and explosion. The accident scenarios include incidents involving transportation, storage, handling and launch operations. The DEIS describes both the generation and management of hazardous wastes.

5. A shoreline management plan that will provide for improved public access when launches are not scheduled is being prepared in conjunction with the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

University of Hawaii at Manoa

Institute for Astronomy
2680 Woodlawn Drive • Honolulu, Hawaii 96822
Telex: 723-8459 • UHAST HR

Office of the Director

RECEIVED
NOV 1 1989
Office of Space Industry
DBED

October 31, 1989

Mr. George Mead
Department of Business and Economic Development
P.O. Box 2359
Honolulu, HI 96804

Dear George,

I appreciate the opportunity to comment on the joint Federal and State Environmental Impact Process for the proposed commercial rocket launching facility in Kau district on the island of Hawaii. I was able to attend part of your public scoping meeting held Friday, October 27th in Honolulu, and was gratified to hear a number of speakers strongly emphasize the importance of maintaining the unique astronomical qualities of the Mauna Kea site.

As we have discussed, the astronomical facilities on Mauna Kea and the proposed rocket launching facilities are largely independent elements of the state of Hawaii's space-related activities. As the University of Hawaii official charged with protecting the astronomical qualities of the Mauna Kea Science Reserve and of representing the concerns of current users in this area, I had previously identified potential impact by the proposed commercial rocket launch facility in the areas of:

1. Light pollution
2. Radio Frequency Interference
3. Release of particulate and other contaminants in the atmosphere above the tropical inversion layer.

as areas where the proposed launch facility had the potential to impact astronomical observations on Mauna Kea. I believe these concerns will be adequately addressed in the proposed joint federal and state environmental impact process and understand that in any case where the potential for perceptible degradation is identified, full mitigating measure would be required to be developed before proceeding with the project.

As a result of review of the document you sent me, and of the safety assessment by the U.S. Department of Transportation of the proposed Hawaii launch sites, the issue of night launches has come to the fore. I had been given to understand that night launches would be the exception, and would only take place when driven by unique operational requirements. I was concerned to read on page 35 of the safety assessment of the two proposed Hawaii

launch sites that the predominately onshore daytime surface winds over both proposed launch sites may make certain pre-launch operations "involving particularly hazardous substances more difficult in the day" and that "the night time surface winds of both sites are much more favorable for pre-launch operations and should mitigate any difficulty achieving certain operations during the day." If the frequency of night time launches is likely to be significantly increased by local meteorological conditions, it is essential that an assessment of the impact of night time launches on observatory operations be included in the EIS process.

I appreciate the opportunity to comment on your documents and look forward to working closely with you as the process continues.

Sincerely,

Donald N. B. Hall
Director

DNBH:ga

cc: Mauna Kea Observatory Directors
David Yount
(UH VP for Research & Graduate Education)
Ralph T. Horii
(UH VP for Finance & Administration)

11-52

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGERT
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Donald N. B. Hall, Director
Institute for Astronomy
University of Hawaii
2680 Woodlawn Drive
Honolulu, Hawaii 96822

Dear Mr. Hall:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 31, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate the time that you and your staff have been willing to spend meeting with our consultants on light pollution, radio frequency interference and the potential release of particulates and other contaminants into the atmosphere to assist us in the development of the DEIS. Through their joint efforts, we believe that the concerns which you identified in your letter have been addressed.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

HELENE H. HALE
Councilwoman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
NOV - 1989

October 30, 1989

Mr. George Mead
Department of Business and Economic Development
P.O. Box 2359
Honolulu, HI 96814

Dear Mr. Mead:

I have tried to be objective about the space port plan. However, the "Safety assessment of the Two...Sites" which was done by Research Triangle was so poorly done that I hope it does not represent the kind of reports that the EIS will produce.

The deadline for comments is October 23 but the meeting was not held until October 27.

In light of Community concerns and outright opposition I hope the EIS will adequately address the "no facility" option.

Please address the following concerns:

1. Impact on air quality in Kona.
2. Possibility of military use.
3. Compensation to property owners for inconvenience, health and safety hazards.
4. Specific employment opportunities for Ka'u residents.
5. Impact on housing for imported labor.
6. Historical sites worth preserving in unaltered state.
7. Impact on Hawaii Volcanoes National Park.
8. Transportation of liquid propellants.

It is unclear to me whether a full blown Environmental Impact Statement will be prepared or is the "Environmental assessment" all that is being done in connection with the Master Plan.

Aloha,

Helene H. Hale
Councilwoman

HAWAII COUNTY COUNCIL
ECONOMIC DEVELOPMENT COMMITTEE
SEPT. 22, 1987

Points raised:

1. There have been four ruptures of plutonium containers which have caused more plutonium in the atmosphere than all nuclear bomb testing.
(Steven Phillips)

2. Will nuclear powered systems be used?
(Steven Phillips)

3. Could military use the facility; would Star Wars activities be conducted?
(Steven Phillips)

4. Rocket launchings leave behind two deadly pollutants--aluminum oxide and acid rain. Aluminum causes Alzheimer's disease; there were 9 cases on Guam and the military is present on Guam.
(Ruth Mary Bass)

5. Kahilipali Area is dry; fire hazard. Also rockets can cause a "no rain" condition which would worsen things.
(Ruth Mary Bass)

6. Nuclear powered satellites would be transported by road from Hilo.
(Ruth Mary Bass)

7. Senator Matsunaga proposed a "space expo" as an alternative to a launch site.
(Various)

8. Non-launch activities show the most promise from the point of view of jobs and economic benefit plus they are non-polluting. Launch facility need has not been demonstrated, has few jobs, much less economic impact and is both polluting and hazardous.
(Various)

9. Large established companies (MACDAC, M-M, GD) are satisfied with government ranges, have made arrangements for further use; will not move to Hawaii. This leaves only newly formed companies who want to escape the stringent rules, have no experience, have no capital, and will cut corners. If safety problem, NASA will stop activity until properly fixed (i.e., Challenger), commercial company needs eye on bottom line and cannot afford to do things right. Don't want an Edsel space company coming in.
(Marcus Castaigne)

10. There is a difference between the executive summary and the study. Council must read full study before passing on the resolution.
(Various)

11. Ka'u gets only the launch site; the other activities go on elsewhere.
(Various)

12. An EIS must be done. Infrastructure must be provided (road improvements, no water in Ka'u, port, airport, housing). Neither should be paid for by State nor county. The developer should pay. Would tax revenues be sufficient to offset costs?
(Various)

13. Resolution should not pass until dollar limit is decided for county and State expenditures.
(Various)

14. Irradiation issue mentioned.
(Various)

15. Small or modest launch facility is simply the "foot in the door."
(Cora Walsh)

16. Whales cannot stand explosive noises; their presence would limit launching activity (already determined to be well taken care of by existing facilities) to but four months per year.
(Cora Walsh)

17. ADL study did not deal with specific environmental issues.
(Douglas Walsh)

18. The biggest stumbling block to space launch is the higher insurance rate; further, the State and county may be held responsible for accidents.
(Douglas Walsh)

19. Use Palmyra Island.
(Douglas Walsh)

20. The military has an expressed right to take over the launching facility.
(Margaret McGuire)

21. In response to point that KSC is a wildlife refuge--how many endangered species were lost and how many people were displaced by that development?
(Margaret McGuire)

22. Commercialization of space may be found in the future to be detrimental to planet earth. Analogy was drawn to FDA withdrawing drugs after they were initially approved. What happens to our investment then?
(Linda Lyerly)

23. Many scientists have spoken out against a launching facility.
(Linda Lyerly)

24. Mufi Hanneman is attending the Pacific Rim Opportunities Conference the title of which is "The Moon and Beyond." This clearly is for manned launches which was previously told to us as not happening. You aren't telling us the truth.
(Linda Lyerly)

DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7432250 HIDPED FAX: (808) 548-8156

November 6, 1989

The Honorable Helene H. Hale
Councilwoman, Hawaii County Council
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

Dear Councilwoman Hale:

Thank you for your letter of October 30, 1989, forwarding your concerns which you would like to see addressed in the Environmental Impact Statement (EIS) for the commercial rocket launching facility proposed for the district of Ka'u.

The deadline for comments you referred to, October 23, was extended to November 17, 1989 and was announced at the various scoping meetings held during October 25-27, 1989.

11-56 The "Environmental Assessment" is part of the filing of a Notice of Preparation which officially begins the comment period for public and agency input for the EIS process. The State and the Federal US Department of Transportation (Office of Commercial Space Transportation) are in the process of preparing a joint EIS. The Draft EIS will be ready in June or July for public and agency review. We expect to have the Final EIS available in October 1990 for submission to the Governor for acceptance. The US Department of Transportation would then adopt the EIS.

Should you have any questions or points needing clarification please let me know.

Sincerely,

George W. Mead

George W. Mead
Executive Director
Office of Space Industry

cc: US Department of Transportation (Office of Commercial Space Transportation)
CH2M Hill, Portland, OR

ROBERT H. MAKUAKANE
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
OCT - 5 1989
Office of Space Industry
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September 28, 1989

Mr. George W. Mead
Director
Office of Space Industry
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead:

This is to thank you for the Enviromental Assessment and Notice Preparation for "An Enviromental Impact Statement For A Master Plan For The Development Of A Commercial Rocket Launching Facility."

Very truly yours,

Robert H. Makuakane
Councilman

RUSSELL S. KOKUBUN
Chairman & Presiding Officer

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

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October 20, 1989

Mr. George W. Mead
Director
Office of Space Industry
Department of Business
and Economic Development
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead: George

I have received your communication dated September 25, 1989 transmitting a copy of the Environmental Assessment and Preparation Notice for the EIS for the Master Plan of the Rocket Launch Facility in Ka'u. Your communication was referred to the Council's Economic Development Committee for review. The Economic Development Committee took this matter up for consideration at its meeting on October 10, 1989 and moved to receive and close the file on this information.

Thank you for keeping this office updated.

Sincerely,

Russell

Russell S. Kokubun, Chairman
Hawaii County Council

Bernard K. Akana
Mayor

Department of Parks and Recreation
25 Aupuni Street, Rm. 210 • Hilo, Hawaii 96720 • (808) 961-8311

George Yoshida
Acting Director

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October 17, 1989

George W. Mead
Director, Office of Space Industry
Department of Business and Economic Development
P. O. Box 2359
Honolulu, Hawaii 96804

Subject: Commercial Rocket Launching Facility, Ka'u, Hawaii

Dear Mr. Mead:

Thank you for the opportunity to review the environmental assessment and notice preparation for an EIS for the proposed launching facility.

Of particular interest to us is the "population control zone" and what impacts this zone would have on access to the shoreline.

Thank you again for the opportunity to provide input during this phase of the project.

Sincerely,

George Yoshida
Acting Director

cc: CH2M Hill (Attn: John Everingham)
1585 Kapiolani Blvd., Suite 1312
Honolulu, Hawaii 96814

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN W
Gov
MUFI HANNEM
Di
BARBARA KIM STA
Deputy Di
RICK EG
Deputy Di
TAKESHI YOSHI
Deputy Di

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. George Yoshida, Director
Department of Parks and Recreation
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 20, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. In response to your specific comments, there will be restrictions on shoreline and marine activities before and during launch operations for safety reasons. A study has been completed on current recreational uses along the Palima Point coastline and the potential impact of the proposed facility on these activities. In addition, a shoreline management plan that will provide for improved public access when launches are not scheduled is being prepared in conjunction with the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Bernard K. Akana
Mayor
Duane Kanuha
Director
William L. Moore
Deputy Director

Planning Department
25 Aupuni Street, Rm. 109 • Hilo, Hawaii 96720 • (808) 961-8288

RECEIVED
Office of Space Industry
DBED

October 19, 1989

George Mead, Executive Director
State Department of Business and
Economic Development
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Mead:

EISPN - Master Plan for Commercial
Rocket Launching Facility
Ka'u District, Island of Hawaii

We have reviewed the EISPN for the subject project and offer the following comments.

1. The Draft EIS should include clearer and detailed maps delineating the Population Control Zones (PCZ) and Impact Limited Lines (ILL). The ILL should be extended over the ocean in order to show the maximum surface area of earth (land and sea) which would potentially be impacted. The maps should also show the proposed sites in relation to existing subdivisions as well as include the flight path corridor and heliport location.

2. Data specifications for the two Japanese rockets, H-I and H-II, as well as the American rocket models should be described. The type of liquid propellants that would be used for these models should also be discussed. Discussion on impacts such as noise, air quality, etc. should include assessments of these models also.

3. On Page 3, the EA states that it is envisioned that the State will acquire and/or control the land located within the PCZ boundary. The Draft EIS needs to address the impacts on displacement of landowners, agricultural activities and employment, and Hawaiian Home lands. Will there be any compensation?

4. Pages 6 and 7 discuss calculations/predictions of where the pieces of the rocket itself may fall if flights are terminated or in case of failures. Under normal conditions, where the rocket or rocket stages would fall and what its impacts would/could be need to be addressed in the Draft EIS.

5. An assessment of energy needs should be discussed. In addition, an infrastructure impact assessment for roads, airports, and harbors should be included in the EIS.

6. The Draft EIS should discuss whether off-site facilities will be utilized for different components of the launch operations. That is, whether all computer operations controlling the actual launch will be done on-site or controlled from elsewhere - Hilo, California, Texas, etc.

7. How the ocean activities will be policed and/or impacted during launching/non-launching periods need to be discussed in the Draft EIS. Further, Page 7 discusses compatible uses such as recreation, wildlife habitat, or agriculture in areas inside the population control zone not dedicated to facilities. The EIS needs to further address public safety for these activities.

8. Flash flooding in the area has been described by residents of the area. Potential for such flood hazards should be described in the Draft EIS, including a mapping of the potential and/or actual flood channels in the area, particularly for the Palima Point site.

9. On Page 17, the EA states that no casualties outside the facilities have occurred. Were there any casualties inside any of the facilities?

10. The systems for meteorological monitoring, air quality monitoring, radar, etc. should also be shown on appropriate maps and illustrations.

11. The Draft EIS should discuss the compatibility of the project to land use plans and policies. The necessary permits and approvals required for the project should also be included.

Thank you for the opportunity to review and comment on the subject project.

Sincerely,

DUANE KANUHA
Planning Director

AK:syw

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Virginia Goldstein, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Ms. Goldstein:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 19, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. Clear and detailed maps will be included in the DEIS. Please note that the DEIS will focus on Palima Point, the preferred site.

2. The DEIS discussion on launch vehicles addresses the candidate vehicles described in the Conceptual Plan. These are the Atlas, Delta, Conestoga, Scout, and Taurus. Potential impacts are described only for vehicles that are in actual use. The Japanese H-2 is still under development. Potential impacts from this Satellite will be addressed at such time as it becomes a candidate vehicle for use at the facility.

3. The DEIS discusses land ownership, alternate strategies for limiting access within the population control zone, and potential impacts on landowners and the surrounding communities.

4. Potential debris dispersion has been modeled and is described in the DEIS.

5. Assessments of energy requirements and infrastructure needs are included in the DEIS.

6. Range safety is discussed in detail in the DEIS.

7. The DEIS addresses population controls for both water and land areas during launches. In addition, a shoreline management plan has been prepared to address increased shoreline access during non-launch periods.

8. A drainage and flooding study has been prepared for the site by Parsons Hawaii. This will be included in the DEIS.

9. There have been on-site worker fatalities associated with processing launch vehicles and payloads, reflecting the hazards of the facility which are typical of a light industrial complex (e.g., an airport). However, there have been no off-site, non-worker fatalities.

10. The monitoring systems are shown to the greatest practical extent, keeping in mind that the DEIS is being driven by a conceptual plan.

11. Compatibility with land use plans and policies and a list of the required permits and approvals are included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Bernard K. Akana
Mayor
Hugh Y. Ono
Chief Engineer
Bruce C. McClure
Deputy Chief Engineer

Department of Public Works

25 Aupuni Street, Rm. 202 • Hilo, Hawaii 96720 • (808) 961-8321 • Fax (808) 969-7138

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OCT - 9 1989
Office of Space Industry
DBED

October 3, 1989

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT
ATTENTION MR GEORGE MEAD
P O BOX 2359
HONOLULU HI 96804

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR KAU ROCKET LAUNCHING FACILITY
KA'U, HAWAII

11-62

Thank you for the opportunity to review the subject document. Our comments on the Kahilipali Point side are as follows:

1) What does the dashed line from Mamalahoa Highway to the Operations Control Center represent? Is this a proposed road? It looks like it passes through some residences.

2) The Industrial Area is below the Naalehu Flood Control Project. The impact of the drainage through this area should be studied.

3) The South Point Road is difficult to see on Figure 3. Why isn't access to the pads taken from South Point Road? This is a County road and would benefit the County if it were to be improved.

4) Is it necessary for the pads to be so close to the shoreline?

for Robert K. Yanabu, Division Chief
Engineering Division

DHM:ama

cc: Planning Department
CH2M Hill

JOHN WA
GOV
MUFI HANNEMA
Dir
BARBARA KIM STAN
Deputy Dir
RICK EG
Deputy Dir
TAKESHI YOSHIH
Deputy Dir

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Donna Fay Kiyosaki, Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Ms. Kiyosaki:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (of October 3, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. In response to your specific comments, the layout of the proposed project at Palima Point has undergone substantial revisions since the Notice of Preparation was published. All facilities are a significant distance from existing residences. In addition, please note that the DEIS focuses on Palima Point, the preferred site.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 969-1421 • FAX (808) 969-6996

October 4, 1989

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Office of Space Industry
DBED

State Department of Business
and Economic Development
P.O. Box 2359
Honolulu, HI 96804

COMMERCIAL ROCKET LAUNCHING FACILITY
KA'U DISTRICT

Thank you for giving us the opportunity to review the environmental assessment and notice of preparation for a commercial rocket launching facility in Ka'u.

The development of new ground water sources should not affect our existing water facilities.

H. William Sewake
Manager

CS

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM
Central Pacific Plaza 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

JOHN WAIH
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTI
Deputy Director
RICK EGG
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

July 8, 1993

Mr. H. William Sewake, Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Sewake:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (of October 4, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. In response to your specific comments, the proposed project will not affect existing water facilities, as you noted. The needed water will be supplied from new sources, developed at the project operator's expense.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Bernard K. Akana
Mayor
Victor V. Vierra
Chief of Police
Wayne G. Carvalho
Deputy Chief of Police

Police Department
349 Kapiolani Street • Hilo, Hawaii 96720 • (808) 961-2244 • Fax (808) 961-2702

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OCT 12 1989
Office of Space Industry
DBED

October 10, 1989

Mr. George Mead
Department of Business
& Economic Development
P. O. Box 2359
Honolulu, Hawaii 96804

RE: ENVIRONMENTAL ASSESSMENT AND NOTICE OF PREPARATION FOR AN EIS FOR A MASTER PLAN FOR THE DEVELOPMENT OF A COMMERCIAL ROCKET LAUNCHING FACILITY

Dear Mr. Mead:

The following comments on the Environmental Assessment are for the alternate site at Kahilipai Point:

1. The Hawaii County's Public Safety Radio System has a radio facility located about 1.2 miles south of Naalehu. This places it about a mile within your "population control zone" where the public will be excluded during launch operations. We, however, need to have access to our radio facility whenever there is equipment breakdown, even during launch operation.

2. Your proposed radar pad located about three-fourths of a mile south of Naalehu will be in an area directly in line with our microwave link to Kulani Cone. This microwave link is part of our County microwave "backbone" and because it is also a long path, we cannot have this link degraded in any way.

3. Is there a possibility that we will experience interference in the 2 GHz and VHF spectrum?

Thank you for this opportunity to provide comments. If you have any questions regarding the above comments, please call our radio technician, Richard Matsunami, at 961-2280.

Sincerely,

VICTOR V. VIERRA
CHIEF OF POLICE

RM:crp/lli

Bernard K. Akana
Mayor
Victor V. Vierra
Chief of Police
Deputy Chief of Police

Police Department

349 Kapiolani Street • Hilo, Hawaii 96720 • (808) 961-2244 • Fax (808) 961-2702

RECEIVED
OCT 2 5 1989
Office of Space Industry
DBED

October 26, 1989

Mr. George Mead
Director, Office of Space Industry
Department of Business and
Economic Development
P. O. Box 2359
Honolulu, Hawaii 96814

Dear Mr. Mead:

I have reviewed the Environmental Assessment for the development of a rocket launching facility in the Ka'u district and foresee an increase of calls for services due to the socio-economic growth.

Sincerely,

VICTOR V. VIERRA
CHIEF OF POLICE

FCDeM:sk

cc: Ka'u Police

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Victor Vierra, Chief
Police Department
County of Hawaii
349 Kapiolani Street
Hilo, Hawaii 96720

Dear Chief Vierra:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letters of October 10 and 26, 1989, copies enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letters. However, in response to your specific comments:

1 & 2. Please note that the DEIS focuses on the preferred site, Palima Point.

3. There is the potential for radio frequency interference, as the facility will utilize equipment operating in the VHF and 2 GHz range. Frequency coordination and compliance with FCC frequency allocations will ensure that both the Police Department and the satellite launching facility will be able to operate without causing mutual radio frequency interference.

4. The DEIS discusses the social and economic impacts the proposed facility will likely have on the Ka'u District.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Department of Business and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

November 5, 1989

Office of Space Industry
(808)

Dear Mr. Mead,

This document is to address a written comment on the Environmental Assessment and Notice of Preparation related to the proposed commercial rocket launching facility in Ka'u.

To summarize, I have four major immediate procedural concerns prior to addressing the EIS substantive concerns:

1. Procedural problems related to lack of notice for the public scoping meetings for the joint OCST-DBED EIS.

2. Lack of Licensing Standards, promulgated with due regard for NEPA requirements, for Commercial Rocket Launch Facilities by OCST. Apparently, they are planning to 'make-up' the rules as they go along.

3. Lack of tiering as encouraged by NEPA. No programmatic EIS has ever looked at the question of whether commercial launch facilities are environmentally sound and what mitigating measures, if any, are needed to be required in the licensing standards.

4. The *Safety Assessment* issued by OCST is not a reassuring document. If this is a sample of a critical safety analysis done by OCST, then the U.S. commercial space program will be in deep trouble as the inevitable accidents occur related to negligent, slovenly research. One need look no further than the "Challenger disaster" to find evidence of the havoc that sloppy data coupled with thoughtless analysis renders.

First, the publication dates for the public scoping meetings (which were intended to be a part of the mandated DOT 'citizen involvement' and that were held Oct. 25, 26, 27), in the Federal Register were first listed on September 25 with new times and/or venues announced Oct. 20, 1989 for ALL five meetings. The County Council received notice from DBED at 9:36 a.m. on Oct. 23, according to Larry Mosher, aide to Councilman Schutte.

Second, when I go for my driver's license, I am judged by a *pre-determined* set of standards that is applied universally to all license applicants. OCST has NO such standards for licensing the even more significant (in terms of potential human impact) license applicant commercial launch facilities. OCST has no rules, such as the Uniform Building Code has, that have been tested through public and expert scrutiny to determine efficacy for meeting safety requirements, such as mandated in the OCST enabling statutes. Such rulemaking would, of course, fall under NEPA regulations providing an opportunity for the needed public input.

Third, and similar to concern two, is that no 'hard-look' has ever been taken at whether non-military related (NASA being military related to the Air Force) commercial facilities COULD EVER be safe. The whole question should be addressed in a programmatic EIS BEFORE a site-specific EIS such as the one now under way is ever done. To do otherwise is to require the State of Hawaii to address a range of concerns that should rightfully be covered under a nation-wide 'blanket' programmatic EIS. For example, what exactly are 'safe' distances for populations to reside from launch pads?

Finally, the inadequacy of the recently released *Safety Assessment* is chilling to those of us who are relying on OCST for protection of our lives and health. A more detailed description of these concerns (see letter 10/17/89 to EPA) is attached.

EIS CONCERNS:

The following are concerns based on the EA published in September 1989 by DBED:

1.
Infrastructure - TOO LITTLE, TOO LATE, TOO COSTLY TO THE TAXPAYER

Need to compare Kona population projections with Ka'u's.
Kona shows steady increase, while Ka'u stays even.

How will lead time on infrastructure be met in time for 1993 completion For ex., HCOA newest plan runs Oct 1 1989-1992 so no new plans can come on line til that time. Look at the difficulty in keeping kids in classrooms so far. DOE, Water, Public Health, Social Services, etc., etc. largely plan for long term based on best available projections. Plus these unplanned for demands would involve extra cost for non-budgeted, emergency provision of infrastructure to meet the demands of space related population growth.
ASK - Who will pay these costs?

2.
WINDS!!!
Average wind speed quoted in EA as 10-20...HA!
In space launches, must consider MAXIMUM wind speed on daily gusts. This is the critical factor - not average speed.
ASK _ # days per year with gusts under 25-35 mph at KahiliPali, especially.

Scott Wolf is available as a Ka'u Wind Expert as he gives out the daily wind speeds on his windsurfing reports.

The fact that wind is a prominent concern is illustrated by the businesses evolving from wind-usage: notably, windsurfing and windmills. Mitsubishi must have extensive wind records for the South Point area, since they have made a major investment in the region.

3.
DECLINE IN REAL ESTATE PROPERTY VALUES

ASK- Realtors what will happen to the market in the area of the launch and also the areas removed from the site.

4.
HOW MUCH WILL IT ALL COST US TAXPAYERS?

Look at base cost figure v. potential tax revenue to state over the life of the project.

ASK - Can a private corp. absorb the costs projected for adequate infrastructure/ environmental pollution abatement/safety control measures? These are 'non-essential' to product delivery and frequently short-cutted in the desire to see a bottom-line profit!

ASK - How much will it cost each taxpayer in Hawaii compared to the most CONSERVATIVE estimate of taxes receivable from the venture over its shortest expected lifetime, i.e., WHAT"S THE WORST CASE SCENARIO?

ASK _ Why isn't the state giving the spaceport project the scrutiny related to infrastructure/environmental concerns like the Riviera Resort is getting?

5.
HIGH CITIZEN INTEREST AND POLITICAL INSTABILITY

The exceptionally high degree of citizen interest must be considered as a destabilizing factor since the populace is vocally against this project and rapidly organizing a state-wide response.

6.
GEOLOGICAL INSTABILITY

Several fault zones run through the region and I have experienced a significant earthquake that would have damaged a tower or concrete pad. The earthquake of 1868 even caused the destruction of a village in Wood Valley.

7.
LACK OF MARKET NICHE

The world-wide competition is too stiff to make this venture econmomically feasible.

A complete list of all launch sites world wide must be included, including how many of the maximum/minimum launches per year will be sought for each pad.

8.
HOW TO ASSEMBLE LAND WITHOUT "ANOTHER SLEAZY HAWAIIAN HOMES LAND DEAL"

The HHL homestead areas at South Point are not "non-productive", as Admiral Hayward stated they were after the UHH forum on October 31, 1989.

9.
HOW TO "CONTROL" LAND

The residents of the area neither wish to voluntarily or involuntarily leave their homes and farms, nor to surrender them through eminent domain.

We have not been consulted in the planning at any stage of this project's development. The community representatives ignore our requests (see article in Honolulu Star-Bulletin, October 27, 1989, Friday) and deny us access to DBED information. We are subsequently labeled "misinformed" in the press by the highest paid state employee, space-czar Admiral Hayward. Therefore, the area residents remain hostile and untrusting of the state representatives when giving safety reassurances.

10.
RELIANCE ON FAULTY SAFETY DATA

The Safety Assessment issued by the OCST is a sorry excuse of a scientific analysis. None of this document should be incorporated into the EIS.

Close examination of the failure rates of each ELV must be considered in relation to the potential losses in the vicinity of the launch sites.

How can safety in handling the multitude of hazardous materials be guaranteed for the unknown business who is supposed to be building/operating this facility? What enforceable controls will be maintained to guarantee the public's safety?

These are important concerns since mitigating measures, such as control on hazardous material handling are optional to the developer, as no agency enforces the EIS provisions.

Further, we are told that toxic fumes from substances such as Nitrogen tetroxide "will be at safe levels at the " PCZ (p.18). I live WITHIN the PCZ, so I'm dead, right?

A through cost-benefit analysis looking at total costs for the taxpayers is also needed.

I wish to be given "consulted party" status, as does the Green Sands Community Association. The organization, Citizens With Space Concerns, c/o myself, also wishes "consulted party" status.

I have not yet received the Schroeder Report. I hope it is forthcoming.

Sincerely,

Sandra L. Demoruelle

Sandra L. Demoruelle, RN
Green Sands Community Association
Box 588, Na'alehu, Hawaii 96772

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

JOHN W.
MUFI HANNEM
BARBARA KIM STA
RICK E
TAKESHI YOSHI

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Green Sands Community Association
Attention: Sandra L. Demoruelle
Box 588
Naalehu, Hawaii 96772

Dear Ms. Demoruelle:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of November 5, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. Economic and financial considerations. Infrastructure improvements needed to support the proposed facility will be paid for by the State and the corporation or consortium which will operate the facility. The potential economic costs and benefits of the proposed project and the potential economic and financial impacts on the community, the Island of Hawaii, and the State are discussed in the DEIS. The assessment includes the potential impacts on housing prices and the cost of living in Ka'u. Action alternatives, including the "no action" alternative, are addressed in the DEIS. Please note that the DEIS focuses on Palima Point, the preferred site.

2. Meteorological conditions. The various analyses and modeling of impacts included in the DEIS are based on existing meteorological data and utilize eight different weather condition scenarios.

3. Geological conditions. Potential impact assessments from both seismic activity and lava inundation have been examined. These reports will be included in the DEIS.

4. Land ownership and safety. The DEIS discusses land ownership, alternate strategies for limiting access within the population control zone and potential impacts on landowners and the surrounding communities. All landowners within the population control zone have been contacted.

5. Safety. All aspects of safety relating to the proposed facility are considered in the DEIS. Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. The accident scenarios include incidents involving transportation, storage, handling and launch operations. Human health and ecological risk assessments have been completed for normal activities as well as launch anomalies.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Marvin T. Miura
Director, Office of Environmental Quality Control
Roy Sakamoto
Environmental Technical Specialist
Office of Environmental Quality Control
465 South King Street Room 104
Honolulu Hawaii 96813
August 16, 1991

Dear Dr. Miura And Mr. Sakamoto,

INFS (Informational Network for the Spaceport) was formed several years ago by the resident's of Green Sands Subdivision in response to seeing their homes placed within the spaceport's "population control zone." Our purpose is to monitor the spaceport development and report our findings to the public.

As the INFS Project Coordinator responsible for producing an economic feasibility report on DBEDT's proposed 'spaceport', I was interested in seeing your comments submitted to Mr. Mead on September 27, 1989. My concerns mirror those expressed by yourselves in the second point you expressed in the letter, regarding potential economic feasibility of the project.

When asked at a public meeting to present any kind of financial analysis indicating whether this project could ever be viable, Murray Towill and George Mead were said they were unable to produce even a basic market survey to lure potential developers. Towill justified continued state expenditures on spaceport promotional activities and environmental studies by saying the department "*THINKS*" the project might be economically worth pursuing.

Mead, at the same meeting, said his Office was not doing an economic analysis of the spaceport because, unlike Florida, the government was not going to pay for developing it. Well, there are many 'sunk costs' in this project to date, and many more to be anticipated that will fall on the taxpayers to absorb even if a private developer can ever be found to bear the facility development expenses.

Will you permit acceptance of a DEIS that does not contain the economic feasibility analysis you and I request?

I look forward to receiving your comments on my concerns. I am attaching a preliminary C/B comparison I was able to construct from Florida data and the sketchy financial and launch rate data DBEDT has revealed. A detailed report will be forth-coming this Fall.

Thank you for your attention to this concern.

Sincerely,
Sandra L. Demoruelle
Sandra L. Demoruelle
Box 588, Naalehu Hawaii 96772

FINANCIAL COMPARISON SUMMARY FOR A COMMERCIAL ROCKET LAUNCHING FACILITY IN KA'U

(2 medium/1 small pad configuration)

Prepared by the Informational Network for the Spaceport
Sandra Demoruelle, Project Coordinator

	Florida	INSF	Mead
COSTS: (in millions 1989 $)			
Capital Costs	$170	$425	$500
Federal Stations	N/A[1]	$300[2]	$30-50
Co/State Infrastructure	N/A	$200	?
Administrative[3] Development Costs	N/A	$10[4]	?
Operating Costs (For 10 years)[5]	$130	$230	?
	====	====	====
Total Costs (Development and Ten Years of Operation)	$300	$1165* (*OVER $1 BILLION INVESTMENT)	?
REVENUE: (in millions 1989 $)			
Launch Revenue (For 10 years)	$147.2	$85[6]	$223
NET LOSSES:	$152.8	$1,080	?

$1 BILLION IN LOSSES
==========
(Plus Accidental Losses)

1. Florida pays user's fees for in-place Federal facilities.
2. The INFS projections for Federal telemetry system costs are 10 times higher than Adm. Hayward's, but experience has shown most 'mainland' costs escalate ten-fold in Hawai'i's state public works contract processes (e.g., the multi-million $ band room at Pahala H.S.).
3. Development costs include state/Federal expenses for the Master Plan/EIS, permitting, sunk costs and litigation with community organizations, like INFS.
4. Ten million dollars may be a conservative figure in light of extended community litigations, like Seabrook (N.H. nuclear power struggle lasting twenty years).
5. The costs of catastrophic occurrences on 112 launches (data used in the DBEDT launch rate projections in the OSI *Interim Report*) or through natural disasters not included.
6. INFS revenue projection reflects Florida report's assessment of the "realistic orbital commercial launch market to be about 15 to 20 launches per year." (p. II-34) Of this 15-20 range, only 50% are launched from U.S. facilities. OSI could hope for no more than a third of the U.S. (Vandenberg/CCAS/Wallops) market resulting in only 2-3 orbital launches per year with a mean income of $8.5m./yr.

Director
State Office of Environmental Quality Control
Honolulu, Hawaii

October 23, 1989

Re: Lack of procedural due process for the *Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for a Master Plan for the Development of a Rocket Launching Facility: Ka'u District, Island of Hawaii*, September 1989.

The residents of Green Sands Subdivision have requested that a formal complaint be filed regarding lack of adequate notice for the Scoping Meetings being held for this joint-EIS described in the above mentioned document prepared by DBED (state) and OCST (federal).

According to notices filed September 25, 1989 (see NOI filed in the Federal Register of Sept. 25, '89) and in the *Environmental Assessment* (p.iii), as well as with your office, the dates and times for scoping meetings were clearly delineated. However, subsequent to those official notices there have been changes made that affect the adequacy of the thirty day notice required by OEQC procedures. A meeting in Kona was scheduled for October 25 and the time for the meeting in Naalehu was changed without adequate notice.

As well as this procedural problem, substantive matters are also of concern. The maps published in the E.A. are fraudulent and deceptive. No mention is made of the roads and subdivisions in and around the Population Control Zone at the Kahilipali site, (See maps attached) while even tiny Punaluu is included on the Palima Site Map. This prejudices the decision-making, since more people APPEAR to be affected by the Palima site.

Yet another matter of concern that has been brought to the attention of the EPA (Federal) is that no 'hard look' has been taken at the basic question of the environmental soundness of commercial launch facilities. It is putting the cart-before-the-horse to examine a site-specific EIS before an adequate consideration of the programmatic concern is made at the "go-no go" stage. It is therefore our request that a programmatic EIS detailing the safety concerns overall for commercial launch facilities be prepared by OCST prior to consideration of any specific commercial launch site consideration.

Thank you for your immediate attention to these pressing concerns.

Sandra Demoruelle
Sandra Demoruelle
Informational Network for the Spaceport
Box 588
Naalehu, Hawaii 96772

OFC OF ENVIRONMENTAL QUALITY CONTROL
'89 OCT 26 P1:03
RECEIVED

11-72

JOHN W
Gov
MUFI HANNEM
D
BARBARA KIM STA
Deputy D
RICK E
Deputy D
TAKESHI YOSHI
Deputy D

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Informational Network for the Spaceport
Attention: Sandra L. Demoruelle
Box 588
Naalehu, Hawaii 96772

Dear Ms. Demoruelle:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letters of October 23 and August 16, 1989, copies enclosed) regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies.

The draft environmental impact statement (DEIS) being prepared by the Department of Business, Economic Development and Tourism will address all of the general concerns raised in your letters. Please note that the DEIS focuses on Palima Point, the preferred site. Additionally, you have raised a number of issues in relationship to the economic feasibility of proposed project and its bearing on the DEIS. In response, infrastructure improvements needed to support the proposed facility will be paid for by the State and the corporation or consortium which will operate the facility. The potential economic costs and benefits of the proposed project and the potential economic and financial impacts on the community, the Island of Hawaii, and the State are discussed in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Ka 'Ohana O KaLae

A Ka'u Hawaiian Grassroots Organization

I am a wind resisting A'alii
No wind can push me over

RECEIVED

DEC 1 1 1989

Office of Space Industry
DPED

11-17-89

Enclosed please find comments on items to be addressed in the draft EIS.

Ka Ohana O Kalae
mm ee.

11-73

P. O. Box 672 • Naalehu, Hawaii 96772
Phone: 929-7385 • 929-9529

Written Statement of Ka Ohana O KaLae re: Environmental Impact of Proposed Rocket Launching Facility, Ka'u, Hawaii

1) The Environmental Impact Statement must fully recognize the present status of the District of Ka'u as a unique community, one of only a few remaining areas in Hawaii where traditional Hawaiian cultural values are still alive, with a substantial population of native Hawaiian people, an area which is presently undisturbed by development. Full documentation of the historical and cultural aspects of this community, through thorough notification and solicitation of studies and comments from all possible professionals and expert witnesses, as well as full public documentation from members of the community, will be necessary to fully assess this valuable cultural resource which is the District of Ka'u, its heritage, and its people.

2) A thorough and appropriately lengthy, locally-determined impact study on the effects of industrial or other development on the psychological well-being of the Native Hawaiian people, and on the social fabric of Hawaiian families in Ka'u.

3) The EIS must include full consideration of the implications (including federal liability and culpability involved) of any such use of, or impact on, or alienation of, or irretrieveable and inappropriate commitment of resources of the ancestral lands of Ka'u, especially in view of:

*Sovereignty rights of Native Hawaiians

*Hawaiian Homelands Issues, including Federal responsibilities and feduciary responsibilities to beneficiaries (see enclosed letter from Daniel Inouye to Ka Ohana O KaLae in response to testimony at U.S. Senate Committee on Indian Affairs hearings in Hawaii in August, 1989)

*Implications of Genocide Act of 1988, such as impact on future generations of Hawaiian people and beneficiaries of Hawaiian Homelands of any industrial development; impact on the status of land claims now in process by individual Hawaiians in Ka'u; impact on the status of land rights of all Hawaiians statewide to state lands, ceded lands, and Bishop Estate "trust" lands.

4) A thorough assessment of the loss to the worldwide human community which would be brought about by the continued destruction of Hawaiian cultural values. The concepts of Aloha, and of other significant values embodied in the Hawaiian culture, are of utmost importance to the world situation today. We cannot allow these aspects of the Hawaiian culture, potential tools in solving many of the Earth's environmental and social problems, to be destroyed.

5) A thorough assessment of the ongoing traditional uses of the ocean resources by the people of Ka'u for food and other purposes, and of future projections on the quality and availability of such resources under present conditions. An honest assessment of quality and availability if the spaceport were allowed must be done, including impacts on access and gathering rights.

6) A complete investigation into land ownership on the parcels affected in the two areas proposed for spaceport - Kahilipali Point area and Palima Point area. Some of these lands are being claimed by individuals and entities, such as C. Brewer Co., whose acquisition of such lands is questionable and whose claims are rightfully being scrutinized and contested by individuals with ancestral ties to these lands.

7) A thorough study of the cumulative effects of the myriad of social impacts, psychological impacts, and environmental impacts of any such proposed rocket launching facility on the present residents of Ka'u, especially the native Hawaiian population, must be undertaken.

8) Full and EQUAL consideration must be given to the NO ACTION alternative. Ka'u's present rate of growth is substantial; already certain environmental impacts and land issues are in need of conscientous attention and planning by the local community. The NO ACTION alternative would make it feasible to address these concerns in a logical and beneficial manner, in our opinion, and to have a good chance of preserving the unique resources of Ka'u, its quality of life and quality environment, as well as its native people. Just as much research and effort must be put into analysis of these tangible and all-encompassing assets, such as the lifestyle of the people, as is so often accorded to the narrow category of "economics".

9) Any consideration of economic impacts must include the obvious impacts on the cost of living in Ka'u. At present, Ka'u is one of only two areas on the island of Hawaii where land for housing is still "affordable", this on an island with close to full employment and a growing "homeless" problem. Native Hawaiians, with settlement rights to the Hawaiian Homelands at South Point, would be one group most adversely affected. Job displacement (fishing, agriculture, ranching, etc.), housing costs, competition for employment, food costs, as well as infrastructure impacts, are all among the items to be considered.

10) A thorough investigation into conflicts of interest on the part of elected and appointed government officials, and businessmen, must be conducted. Specifically, Senator Daniel Inouye, in his position as chairman of the U.S. Senate Committee on Indian Affairs, has responsibilities for righting the wrongs on Hawaiian Land issues such as the South Point Hawaiian Homelands set aside in 1921 for settlement by Ka'u Hawaiians and instead hoarded by the state and federal government for such schemes as this rocket launching proposal. Senator Inouye has also taken on the chairmanship of the U.S. Senate Defense Appropriations Committee, and recently voted to increase the so-called "Star Wars" funding by $600 million. With the obvious connections between the proposed spaceport and experimental rocketry research of the defense dept., this dual chairmanship presents a conflict.

Ka Ohana O Ka Lae
P.O. Box 672
Nov. 17, 1989

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ka 'Ohana O Ka Lae
P O Box 672
Naalehu, Hawaii 96772

Dear Sir or Madam:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of December 11, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. Social and Cultural Impacts. Two separate studies have been made of the social and cultural impacts of the proposed project. One covers the community generally and includes a survey of residents. The other focuses on current recreational uses, including subsistence fishing, along the Palima Point coastline and the potential impact of the proposed facility on these activities. Both studies discuss the potential impacts on culture and lifestyles of the people of Ka'u.

2. Land ownership. The DEIS discusses land ownership, alternate strategies for limiting access within the population control zone and potential impacts on landowners and the surrounding communities. All landowners within the population control zone have been contacted.

3. Economic impacts including "no action." The potential economic costs and benefits of the proposed project and the potential economic and financial impacts on the community, the Island of Hawaii, and the State are discussed in the DEIS. The assessment includes the potential impacts on housing prices and the cost of living in Ka'u. Both site and action alternatives, including the "no action" alternative, are addressed in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

October 15, 1989

RECEIVED

OCT 18 1989

Office of Space Industry
DBED

Mr. George W. Mead, DIRECTOR
Office of Space Industry - DBED
P. O. Box 2359
Honolulu, HI 96804

Dear Sirs:

The board, officers and members of the Leleiwi Community Association have the following concerns about the building of a rocket launching facility at Ka'u, island of Hawaii:

1. A disaster due to explosions. Please see attached article about an explosion that took place recently at Vandenberg Air Force Base when an American Rocket Company rocket exploded on the launch pad. Since this is one of the companies interested in launching rockets from our island, it is of great concern as regards the safety and environment of our island and it's people.

2. The use of the launch site by military or non-military contractors to launch rockets that might possibly contain highly toxic and dangerous materials such as plutonium 238. We have read that plutonium 238 is perhaps 300 times more radio-active than plutonium 239, the isotope used in atomic bombs(Common Cause Magazine Jul/Aug 1986, pg. 25). We are very concerned about such materials in use on our island; all citizens, including people in our own community area, could be greatly affected.

3. Air quality in the Hilo area and around the island.

We would support a space center or a space study center for Ka'u on the peaceful use of space but we would strongly oppose any facility that could endanger life and property on our beautiful island or cause harm to our unique environment. We appreciate your consideration of our three main concerns.

Sincerely,

Samuel J. Burris, PRESIDENT
1875 Kalanianaole Ave. #705
Hilo, HI 96720
Tel: 935-9126

Enclosures

11-76

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu Hawaii
Mailing Address: P.O. Box 2359 Honolulu Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

LeiLeiwi Community Association
Attention: Samuel J. Burris
1875 Kalanianaole Ave. #705
Hilo, Hawaii 96720

Dear Mr. Burris:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of October 15, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-77

1. Explosion hazards. There is no question that there are potential hazards associated with Satellite launching. This is the reason for the 2.9 mile population control zone, to allow an adequate distance for safety. Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion to examine whether the population control zone is adequate. The accident scenarios include incidents involving transportation, storage, handling and launch operations. The results of these analyses are included in the DEIS.

2. Military use. On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. This legislation, encoded as Section 201, Hawaii Revised Statutes, was enacted to regulate the payloads of space vehicles launched from within the territory of Hawaii. Section 201-75 of the Hawaii Revised Statutes, adopted on June 19, 1990, reads: "any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source." This Act is a statement

of the desire and intent of the State to use the commercial launching facilities for the peaceful exploration of space, and to prohibit those payloads which could cause harm or destruction.

Hawaii could launch commercial communication and scientific satellites as well as government weather satellites. Certain payloads related to the military could be launched, including weather, communications, scientific, and navigation satellites. All payloads will be launched by commercial Satellites, and launch operations will be controlled by the commercial operator.

3. Air Quality. An assessment of existing ambient air quality and meteorological conditions has been made. Dispersal of the plume produced by normal launches under eight different weather conditions has been modeled. A detailed analysis of all potential impacts and recommendations for mitigating measures have been completed and will be included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

MOKU·LOA·GROUP

SIERRA CLUB • HAWAII CHAPTER

Dept. of Business and Economic Development
Mr. George Mead
P.O. Box 2359
Honolulu, Hi 96804

October 20, 1989

Office of Space Industry
DBED

SIERRA CLUB COMMENTS
ON EA AND PREP NOTICE FOR EIS FOR MASTER PLAN
FOR COMMERCIAL ROCKET LAUNCHING FACILITY

CONCERNS REGARDING HAZARDOUS MATERIALS

1. Please address the need for a hazardous waste facility. What type of waste materials are to be disposed of and in what quantities. Delineate a probable time frame for permitting an acceptable one in this state. Discuss the possibility and probability of interstate and intrastate shipments of other wastes if such a site were located on the Big Island.

2. Please discuss the potential dangers of transporting hazardous wastes on the Big Island road system. What is the worst case impacts on Hawaii Volcanos National Park, Volcano Village and Hilo harbor? For this and all the disclosures please discuss the long term impacts to the year 2003 and for up to 35 launches a year.

3. What is the probability of fuel spills? Is it more than the 1 in 20 launch failure rate?

4. Please discuss the effects/impacts of a 100,000 gallon spill of hydrazine. What risks are incurred? What is the worst case scenario and its area of impact?

5. Please include maps showing different types of accidental releases and the area of impact. Worst case scenario depictions including isopleths of chemical concentration, noise impacts (with decibel isopleths, etc.) and plumes (with concentration isopleths) from emission sources.

6. What kinds of wind patterns produce unacceptable launches and worst case scenarios for dispersion of windborne contaminants?

7. Please discuss the possibility of contaminated water after launch or accident.

8. Please discuss the disposal of waste water and possible contamination of nearshore waters.

9. Please discuss the long term impacts of chemicals and aerosols including but not limited to hydrazine. Include cases of when it leaks, when it is used, when it explodes.

10. Please discuss the potential for radioactive payloads.

BIOLOGICAL CONCERNS

11. Please discuss the endangered species of Kahilipali specifically.

12. Please discuss the faunal and floral concerns of both sites.

ECONOMIC FEASIBILITY CONCERNS

13. Please discuss the cost of the facility that could be borne by the state taxpayers.

14. Please discuss the market uncertainty for this facility. Who holds the risk?

15. Please discuss whether any state compensation/payment arrangement can be worked out for residents relocated during launch or accidents.

ENERGY REQUIREMENT CONCERNS

16. Please discuss the electrical energy requirements for the maximum projected scenario.

SOCIAL CONCERNS

17. Please discuss the impacts of the proposed launch facility and operations on existing and proposed tourist related activities i.e. Riviera resorts and Punalu'u resorts and associated development.

18. Please discuss the possibility and probability of denial of recreational activities.

Thank you for the opportunity to comment.

Submitted by
Nelson Ho
Nelson Ho for the
Sierra Club

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Moku Loa Group, Hawaii Chapter
Sierra Club
Attention: Nelson Ho
P O Box 1137
Hilo, Hawaii 96721

Dear Mr. Ho:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-79

Some time ago, you offered comments (letter of October 25, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. Hazardous materials. Accident scenarios have been developed and a hazard assessment completed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration and deflagration events and accidental spills. In addition, a health risk assessment and an ecological risk assessment have been prepared. The various analyses and models included in the DEIS are based on existing meteorological data and utilize eight different weather scenarios.

   The accident scenarios include incidents involving transportation, storage, handling and launch operations. Human health and ecological risk assessments have also been prepared to cover the transportation corridor from Hilo to Palima Point.

   Other potential impacts addressed include water quality, noise, sonic boom, debris dispersion, and effects from overpressure. Drawings that illustrate these effects, including isopleths, are included in the DEIS. In addition, all technical appendices explaining the assumptions used in the modeling and analyses will be available.

   Each of the propellants and oxidizers that may be used at the facility are described in detail. Potential payloads (including those that may contain radioactive material) and payload processing are also discussed.

2. Biological concerns. A number of special surveys have been made of Palima Point, the preferred site. The surveys include bird and mammal populations, and archaeological, botanical, marine (including sea turtles) and anchialine resources. These will be included as appendices to the DEIS. A detailed analysis of all potential impacts and recommendations for mitigating measures have also been completed and will be included.

   In addition to the survey work performed at the site, the ecological risk assessment described earlier (which was prepared in cooperation with The Nature Conservancy's Hawaii Heritage Program and the U.S. Fish and Wildlife Service) considers potential impacts on vegetation and wildlife in the Ka'u Forest Reserve and along the transportation corridor from Hilo to Palima Point.

3. Economic feasibility concerns. The potential economic costs and benefits of the proposed project and the potential economic and financial impacts on the community, the Island of Hawaii, and the State are discussed in the DEIS.

4. Energy requirement concerns. The electrical energy requirements of the project are discussed in the DEIS.

5. Social concerns. Two studies were completed of the social and cultural impacts of the proposed project. One covered the community generally and includes a survey of residents. The other focuses on current recreational uses, including subsistence fishing, along the Palima Point coastline and the potential impact of the proposed facility on these activities. In addition, a shoreline management plan that will provide for improved public access when launches are not scheduled is being prepared in conjunction with the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

NRDC

Natural Resources
Defense Council, Inc.

212 Merchant Street
Suite 203
Honolulu, Hawai'i 96813
808-533-1075

RECEIVED

OCT 16 1989

Office of Space Industry
DBED

October 13, 1989

Mr. George Mead
Office of Space Industry
Department of Business and Economic Development
P. O. Box 2359
Honolulu, Hawai'i 96804

Re: Environmental Assessment and Notice Preparation for an Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility, Ka'u District, Island of Hawai'i

Dear Mr. Mead:

The Natural Resources Defense Council (NRDC) appreciates the opportunity to comment on the Environmental Assessment (EA) and Notice Preparation for an Environmental Impact Statement (EISPN) for the Master Plan for a proposed commercial rocket launching facility in Ka'u. We hereby request to be a consulted party for the draft Environmental Impact Statement (dEIS).

NRDC is a non-profit environmental policy analysis and advocacy organization, with at least 500 members in Hawai'i, 117,000 members nationwide, and offices in New York, Washington, D.C., San Francisco, and Los Angeles. The Honolulu office is currently working on issues relating to protection of native species and their habitats, including implementation of the State's land use and coastal zone laws to that end, as well as adequate funding of natural resources research and management in the national parks and national wildlife refuges in the State.

We have reviewed the EA and EISPN with these areas of concern especially in mind, but also have looked at safety and economic aspects. In response to your expressed interest in ensuring that the full range of issues related to this proposal is addressed, we offer the following comments.

1. Since the dEIS is apparently to be based on the draft Master Plan, we urge that both documents be made available to reviewers of the dEIS. The EA (p. 3) implies a simultaneity but does not promise it.

Washington Office
1350 New York Ave., N.W.
Washington, DC 20005
202 783-7800

Western Office
90 New Montgomery
San Francisco, CA 94105
415 777-0220

New York Office
122 E. 42nd St.
New York, NY 10168
212 949-0049

2. Figure 2 (Palima Point: preliminary concept layout): were you aware that the National Park Service long-range plans for Hawaii Volcanoes National Park include acquisition of two parcels which cover the portion of the "Great Crack" presently outside the Park's southwest boundary? This acquisition area would bring the Park boundary quite close to your proposed pads 3 & 4.

3. P.7 re debris from a malfunctioning launch vehicle:
   (1) does "shipping" that would be restricted from debris path include private fishing vessels? We recommend consulting with both the Division of Aquatic Resources, Department of Land & Natural Resources, and the local communities on both sides of Ka Lae (South Point) as to numbers of fishing boats using the area and how communication can be maintained with them;
   (2) the effect of launch vehicle debris (including any chemicals) on the nearshore marine environment should be included in the analysis of the potential effects on that area (p. 20).

4. P. 8 re wastewater collection and treatment: what effect is a leaching field in coastal lava going to have on the nearshore marine environment?

5. P. 10 re geology and topography: the information presented recognizes potential for lava inundation, but does not appear to address the effects of either local or distant subsidence. Since the entire Ka'u coast was subject to a massive earthquake and tidal wave in March 1868, it is in within historical possibility.

   The potential for tsunami flooding, whether locally generated or otherwise, also is not mentioned, either here or on p. 19.

6. P. 13 re fauna: both here and on p. 20, the emphasis appears to be on fauna on (or in the nearshore waters of) the site itself. How is project activity (especially noise and vibration) likely to affect (1) the three endangered forest birds ('akiapola'au, Hawai'i 'akepa, and Hawai'i creeper) which have been found in the Ka'u Forest Reserve (which comes down to State Highway 11 at Waiohinu) and runs above both proposed

launch sites), and (2) fish in the Ka Lae - Kahilipali Point fishing areas?

6. P. 21 re economic impact analyis: Since the astronomical facilities at Mauna Kea generate substantial research income to the University of Hawaii, any detrimental impacts of the project on those facilities should be included in this analysis.

7. In Table 2 (pp. A-4 & A-5), the Department of Land & Natural Resources of the State of Hawai'i was omitted from the dEIS consultation list.

Again, mahalo for the opportunity to make these comments. We look forward to participating in the scoping meeting in Honolulu and to reviewing the draft Master Plan and Environmental Impact Statement.

Me ke aloha pumehana,

Susan E. Miller

Susan E. Miller
Hawai'i Representative

cc: Laura B. King, Director,
NRDC Domestic Tropical Forestry Project

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2606 Fax: (808) 586-2377

July 9, 1993

Natural Resources Defense Council
Attention: Susan Miller
212 Merchant Street, Suite 203
Honolulu, Hawaii 96813

Dear Ms. Miller:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-83

Some time ago, you offered comments (letter of October 16, 1989, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

1. The Conceptual Plan was completed and made available to the public in February 1993. It is summarized in the DEIS. Please note that the DEIS focuses on Palima Point site, the preferred site.

2. We have been in communication with the staff of Hawaii Volcanoes National Park during the development of the DEIS. They have many concerns about the proposed project. The issues relating to the Park are addressed in a separate section of the DEIS.

3. Surveys of both commercial and recreational and subsistence fishing, as well as other recreational uses, have been made of the Palima Point area. Separate assessments have been made of marine resources, including anchialine ponds, and of groundwater resources and potential impacts.

4. Wastewater will be collected and treated within a closed system to avoid impacts to groundwater and ocean resources.

5. Potential impacts from both seismic activity and lava inundation have been examined. These reports will be included in the DEIS.

6. An ecological risk assessment has been prepared in cooperation with The Nature Conservancy's Hawaii Heritage Program and the U.S. Fish and Wildlife Service to consider potential impacts on vegetation and wildlife in the Ka'u Forest Reserve and along the transportation corridor from Hilo to Palima Point.

7. Potential effects on the observatories at Mauna Loa and Mauna Kea are a major concern. Since these questions have never arisen before in connection with the launching of Satellites (no other facility is close to an observatory), several special studies have been conducted in cooperation with the Institute for Astronomy. The issues relating to the observatories are addressed in a separate section of the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

(1) Air Quality/Problem rotating winds which recirculate pollutants out to sea, then blow back over Kona Coast (proven by Volcanic Smog)

(4) Geologic Hazards: Major "The Great Fault" and related fracture faults radiating & crossing both sites make the sites a phenomenal hazard. See Survey/Geologic Maps

(10) Social & Cultural Affects: 2 remaining major rural areas for Hawaiian populations Ka'u & South Kona: i.e. Miloli'i, Waiohinu, Na'alehu are pillars in major transforms.

(9) Having explored the Ka Hilipali Point area I have noted as other the major - former (most ancient) Hawaiian site burial caves + tubes, bubbles, initiation to cult sites

(13) (9) Burned major infrastructure such as communications, hotels, the backlash of a mother major industry would stress the taxation system

(14) Waste Products: Burning to stone any waste in Hawaiian volcanic structure ground i.e. C. Brewer chemicals from Chinese dump found lava tubes 5 miles to Smoke, will then buffer to pollute a storage area of water (it is closed to this day)

Name (Please Print) Aelbert C. Aehegma

Mailing Address P.O. Box 768

City, State, Zip Honaunau, HI

Telephone 328-2171

STATE OF HAWAII 1959

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WAIHEE Governor
MUFI HANNEMANN Director
BARBARA KIM STANTON Deputy Director
RICK EGGED Deputy Director
TAKESHI YOSHIHARA Deputy Director

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu Hawaii
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. Aelbert C. Aehegma
P.O. Box 768
Honaunau, Hawaii 96726

Dear Mr. Aehegma:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have raised a number of issues to be addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues, including air quality, geologic hazards, social and cultural impacts, waste products, and effects on taxation. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review. Please note that the DEIS focuses on Palima Point, the preferred site.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 6 1989

Office of Space Industry
DBED

P.O. Box 690
Na'alehu,Hi. 96772
Nov. 3, 1989

DBED
P.O. Box 2359
Honolulu, Hawaii 96804

Attention: Mr. George Mead
Re: The proposed spaceport master plan and E.I.S.

To whom it concerns:

As president of the Green Sands Community Association, representing the subdivision of 464 residential lots that are located within the Kahilipali 2.9 mile population control zone, I am obliged to inform you that many homeowners have vehemently stated that they will NOT voluntarily evacuate their homes during rocket launching. We ask that you adjust your master plan for the proposed spaceport to reflect this sentiment of the Green Sands Subdivision property owners.

Sincerely,

Ruth Marie Bass

Ruth Marie Bass

cc: DOT OCST
CH2M Hill

11-85

P.O. Box 690
Na'alehu,Hi. 96772
Oct. 29, 1989

RECEIVED

NOV 6 1989

Office of Space Industry
DBED

DBED
P.O. Box 2359
Honolulu, Hawaii 96804
Attention: Mr. George Mead

QUESTIONS FOR THE SPACEPORT E.I.S.

*What types of rockets, manufactured by, and launched by what companies are included in this E.I.S.?
*What fuels, propellants will be used by each rocket?
*What are the chemical compounds of each fuel (propellant) for each type of rocket?
*What are the weights and volumes of each chemical compound of the rocket fuels to be used by each type of rocket?
*Are any of the chemical compounds in any of the rocket fuels known carcinogens? If so, what are they?
*What is hydrazine? Is it a known carcinogen?
*What is nitrogen textroxide? Is it a known carcinogen?
*Are either hydrazine or nitrogen textroxide lethal in any dosage, if so what minimum dosage is a lethal to humans?
*What are the chemical compounds of the rocket exhaust for each type of rocket?
*What are the weights and volumes of each exhaust chemical compound for each type of rocket?
*Are any of the rocket exhaust chemical compounds known carcinogens? If so, what are they?
*What is aluminum oxide?
*How did Dr. Daniel P. Perl, director of neuropathology at Mt. Sinai Medical Center in New York, show that nasally inhaled aluminum particles may be linked to Alzheimer's Disease?
*What is Alzheimer's Disease?
*The Naalehu Dairy is within 10 miles of either launch site, the aluminum particles will fall on the pasture lands. Will the aluminum turn up in the milk?
*Is there any known medical research linking orally ingested aluminum to Alzheimer's Disease? Please list the names of those studies and the conclusions of each.
*Where is Naalehu Dairy milk distributed throughout the state?

*What would be the economic impact to this dairy should the aluminum and other contaminants from the rockets turn up in the milk?

*How much aluminum oxide is discharged into the atmosphere for each type of rocket launched? Please give weight and volume.

*What is hydrochloric acid?

*How much hydrochloric acid is discharged into the atmosphere for each type of rocket launched? Please give weight and volume?

*How will rocket exhaust of hydrochloric acid contribute to acid rain?

*What is acid rain? How does it affect trees and plant life?

*What are the effects of acid rain on macadamia, avocado, citrus, and other fruit bearing trees during the budding cycle of the plant?

*What is the radius in which the highest concentrations of rocket exhaust pollutants will fall?

*What will be the impact of the reproduction cycle of the nearby marine life from the rocket pollutants?

*Identify the breeding grounds for each endangered species within 10 miles of either site.

*Noting that launches occur during times when the winds are calm, which is also during the times when fishermen are fishing, how will the launches disrupt this industry?

*How do the Japanese accomodate and compensate their fishermen during rocket launches?

*How will the state and rocket companies compencate the Hawaii fisherman during launches?

*Do the Japnanese launch during fishing season?

*What is the distance of each of the following communities from the nearest launch pad: Pahala, Na'alehu, Wiohinu, Green Sands Subdivision, Mark Twain Subdivision, Discovery Harbor, and the South Point Hawaiian Homes Land?

*What is the 1970 population of each of these communities?

*In reference to future population growth how many parcels of land (residential lots) are located in each of the communities?

* How many land owners (precisely) own property within each of the population control zones for both sites?

*Why does a launch site need a population control zone?

*Explain in detail how the population control zone radius from each launch pad will be determined by the type of rocket, the direction of trajectory, and minimum time requirement before rocket abort, for each type of rocket to be considered in this EIS.

*Precisely what activities go on within the population control zone?

*How will toxic vapors of hydrazine and nitrogen tetroxide be maintained within a population control zone in the event of an explosion or spill, especially if the population control zone is to be variable?

*What would be a worst case scenarios for a hydrazine and nitrogen tetroxide spill for each site?

*Where will fuels and other chemicals be stored?

*What is the distance to the nearest residential community from which the fuels and chemicals will be stored?

*Noting that the growing population of the Green Sands Subdivision have intimated that they as homeowners refuse to voluntarily evacuate their homes during launch, how will this affect the Kahilipali population control zone?

*What would it cost the state to purchase all the property within the population control zone of each proposed site?

*What would it cost the state to purchase Palmyra Island?

*What is the estimate cost of infrastructure for each of the proposed sites?

*Who will purchase third party liability insurance?

*What types of insurance will be required by the launch companies?

*Will the state also incur the cost of liability insurance?

*What is the maximum amount of third party liability insurance coverage available for the rocket industry?

*What companies offer such coverage? Please list names and addresses of each company and the cost of their coverage?

*What fuels will be used by the payloads?

*What are the chemical compounds of the payload fuels, in what weight and volume for each compound?

*What is plutonium? Is it a known carcinogen?

*Is plutonium lethal in any dosage? If so what is the minimum amount of plutonium lethal to humans?

*In the event of in-flight failure or a rocket abort carrying a nuclear powered payload, what would be the worst case scenario, should the nuclear power pack also explode to disperse radioactive particles into the atmosphere?

*What are the wind patterns for the entire island?

*Would it be possible for rocket pollutants to be blown to Kona, Hamakua, or Hilo?

*What is the daily average wind velocity for Kahilipali and for Palima Point?

*How many days per year has the wind velocity been safe enough for rocket launches for each type of rocket?

*What is the geological condition of both sites?

*What is the name of the nearest fault zone and the distance each site is from that fault zone?

*How often do earthquakes occur in the Ka'u district?

*What is the largest earthquake recorded in the Ka'u district?

*What is the worst case scenario for an earthquake and the rupture of toxic chemical storage tanks?

*Noting strong community opposition to the proposed industry, what would be the worst case scenario in an mindless act of terrorism?

Thank you for addressing my questions in this E.I.S.

RUTH MARIE BASS

Ruth Marie Bass

cc: DOT OCST
CH2M Hill

11-87

JOHN WAIHEE
Governor

MURI HANNEMANN
Director

BARBARA KIM STANTON
Deputy Director

RICK EGGI
Deputy Director

TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2404 Fax (808) 586-2377

July 9, 1993

Ms. Ruth Marie Bass
P. O. Box 690
Naalehu, Hawaii 96772

Dear Ms. Bass:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letters of 10/28/89 and 11/3/89, copies enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have presented a number of questions that are addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues. In addition, all of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

Please note that the DEIS focuses on Palima Point, the preferred site. No one will be required to evacuate their homes during a launch.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

T Yoshihara

Takeshi Yoshihara

Enclosure

DEMPSEY WEST REALTY

RECEIVED
DIRECTORS OFFICE
Nov 6 10 58 AM '89
BUSIN...
DEVELOP...

November 2, 1989

Mr. Roger A. Ulveling
Department of Business & Economic Development
250 South King Street
Honolulu, Hawaii

Dear Mr. Ulveling:

Thank you for the invitation to the meetings on the master plan for the development of a commercial rocket launching facility on Hawaii.

Should your office have any minutes and/or summaries of the meetings up to now I would greatly appreciate your mailing me copies. This issue is most important to me not only from a business point of view but also because of my position on the state's commission on transportation.

Please keep me on your mailing list. I sincerely appreciate your assistance.

Respectfully,

Jim Dempsey

Jim Dempsey GRI, CRB
Principal Broker

Real Estate * Residential * Commercial * Rental Management * 98-1747 Kaahumanu St. * Aiea, HI 96701 * 488-0400

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

MY WIFE AND I LIVE IN GREEN SANDS SUBDIVISION IN NAALEHU, KA'U. WE ARE STRONGLY OPPOSED TO THE DEVELOPMENT OF A ROCKET LAUNCHING FACILITY IN KA'U. KA'U HAS A UNIQUE RURAL LIFESTYLE THAT IS BECOMING RARE IN THIS CENTURY. HEAVY INDUSTRY WOULD THREATEN US HERE IN MANY WAYS. THE ENVIRONMENT AT SOUTH POINT IS FRAGILE. THERE ARE MANY SPECIES OF ENDANGERED WILDLIFE HERE THE GREEN TURTLE, (HAWKSBILL) THE HAWAIIAN HAWK, THE HAWAIIAN DUCK, THE HAWAIIAN BAT, THE GALLINULE, THE HAWAIIAN ~~EET~~ COOT, AND THE BLACK NECKED STILT. FOR A FEW JOBS LOCALLY THEY WOULD PUT PEOPLE OUT OF THEIR HOMES, RESTRICT SHORELINE ACCESS, INTERFERE WITH HAWAIIAN HOMELANDS AND NATIVE HAWAIIAN RELIGON AND CAUSE ALL KINDS OF POLLUTION AND ENVIRONMENTAL DAMAGE. SAVE KA'U WE SAY NO TO A ROCKET LAUNCH FACILITY

Name (Please Print) ANTHONY + MARGARET DOHANOS

Mailing Address BOX 920

City, State, Zip CAPT. COOK 96704

Telephone

11-89

JOHN WAIHEE
Governor

MUFI HANNEMANN
Director

BARBARA KIM STANTON
Deputy Director

RICK EGGED
Deputy Director

TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu Hawaii
Mailing Address: P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. and Mrs. Anthony Dohanos
Box 920
Captain Cook, Hawaii 96704

Dear Mr. and Mrs. Dohanos:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have presented a number of concerns that are addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues, including potential effects on endangered species, shoreline access, pollution, and social and cultural lifestyle questions.

Please note that the DEIS focuses on Palima Point, the preferred site. No one will be required to evacuate their homes during a launch.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED
NOV 9 1989
Office of Space Industry
DBED

Dec. 15th 1989

Dear Mr. Mead,

My husband and I are deeply distressed by the proposal of a spaceport being built anywhere on this island. I attended the Hilo Fair and was disgusted with the propaganda aimed at the kids of Hawaii, in selling them the fantasy-glamour of such a future.

There are so many obvious reasons for not doing it, so many obvious reasons why it is not a wise choice

- pollution of the air, and noise pollution
- danger to our health
- ecologically unsound, damaging
- volcanic faults
- etc.

We strongly oppose the spaceport and feel it is immoral to take advantage of some local peoples desires for a better life by feeding them an illusion of benefits to them which do not exist, by preying on their short term desires, sacrificing their futures.

Sincerely

Mr + Mrs. Dwyndam

Eleanor Dwyndam

Jeffrey T. Dwyndam

11-90

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

I object to this Commercial Rocket Launch (proposed) — in the air quality as the Kona Coast has been heavily polluted by the Volcanic Fumes — causing illness and allergies to many persons —
I do not feel we need further fumes to come into Kona Area as there has to be a heavy drift of this —
I also feel there is a certain amount of danger involved of crash/explosion etc — the additional pollutants will not only cor air — but also coffee [illegible] mac nuts papaya banana — water etc etc
I am completely against this project infrastructure is 50 years too late now to put this in with added truck [illegible] will not do the Isle of Hawaii and Kona nothing but harm —
I also understand that because of lack of 30 day notice this meeting not legal & must be repeated in Kona —

Name (Please Print) Fellerman Jane

Mailing Address P.O. Box [illegible]

City, State, Zip Kailua Kona [illegible]

Telephone 3[illegible]

Jane Fellerman

Excuse the envelope but they are all 'sealed' by [illegible]

11-91

JOHN WAIHEE
Governor

MUFI HANNEMANN
Director

BARBARA KIM STANTON
Deputy Director

RICK EGGED
Deputy Director

TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Jane Fellerman
P O Box 1101
Kailua-Kona, Hawaii 96745

Dear Ms. Fellerman:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/5/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have raised a number of issues to be addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues. Particular attention was paid to air quality, including possible synergistic effects with emissions from the volcano. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

T Yoshihara

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 1 5 1989

Office of Space Industry
DBED

5 November 1989

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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proposal: I am dismayed and angry from the following impressions I have of this
① That the State Government has been extremely presumptious in expending large sum of money on this proposal to date, without any mandate for – or even apparent written of – such an obtuse scheme.
② That the DBED seems to have unlimited license to fashion the present "scoping" process – and perhaps even its outcome – ~~as~~ without due consideration – and adequate allowance of time for – community input from those who would be most directly (and permanently) impacted. And further that the superficial public hearings that are now being conducted are more for the purpose of determining how to allay public concern rather than truly ~~[illegible]~~ them as sufficient cause to ~~[illegible]~~ such a proposal.
③ That one of the most obvious areas of impact – Kona – was I can only assume (since no response to that question was offered at the Kona meeting) purposely precluded from the schedule of public meetings as held in Ka'u and Hilo and was only included at the last minute (and with only two weeks notice) as a result of public pressure.
④ That relatively little value – compared to the alleged benefits of such an "economic diversification" – is being placed on the social and environmental impacts that would result from such a facility
⑤ That this form of economic growth is being of benefit to any but a relative few non-residents is a sham – while the degradation of the environment and social fabric will be great and irreparable.

Name (Please Print)
Mailing Address
City, State, Zip
Telephone

Michael Gibson
P.O. Box 1612
[illegible] HI 96750

11-92

STATE OF HAWAII 1959

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WAI
Gove
MUFI HANNEMA
Dire
BARBARA KIM STAN
Deputy Dire
RICK EGI
Deputy Dire
TAKESHI YOSHIH
Deputy Dire

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. Michael Gibson
P. O. Box 1612
Kealakekua, Hawaii 96750

Dear Mr. Gibson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have raised a number of issues in relationship to the proposed project and the DEIS. The DEIS is a comprehensive document, addressing all relevant issues, including economic costs and benefits as well as environmental impacts. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

I wish to be a consultant in this project
It is imperative that all questions brought up at the scoping meetings be dealt with in a real way Lip service to issues of safety and economics simply ~~are~~ will reflect your incompetence to deal effectively with the problems you are creating. Continued state funding to perpetuate misleading "facts" is morally questionable. You will be held liable for the safety of Hawaii's residents & any detrimental effects perpetuated on Hawaii's people and economy. Landowners haven't a right to adversely affect their neighbors via noise, rubbish etc or to force the evacuation of neighbors. What makes C. Brewer special?
In your PR pamphlet entitled "Hawaii's Space Frontier" 8 avenues of development are delineated only 1 of which is dealt with here. To what extent are other avenues being examined? I'd like a full report. You've stated that areas

Name (Please Print) Gigi Glover representing my family

Mailing Address Box 107

~~City, State, Zip~~ 2440 Campus Rd

~~Telephone~~ Honolulu Hawaii

11-93

JOHN WAI
Gover
MUFI HANNEMA
Dire
BARBARA KIM STANT
Deputy Dire
RICK EGG
Deputy Dire
TAKESHI YOSHIHA
Deputy Dire

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Gigi Glover
2440 Campus Road, Box 107
Honolulu, Hawaii 96822

Dear Ms. Glover:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

The DEIS is a comprehensive document, addressing all relevant issues including safety, noise and economic impacts. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

Please note that the DEIS focuses on Palima Point, the preferred site. No one will be required to evacuate their homes during a launch.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

T. Yoshihara

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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I am against any type of space port and rocket launching facility in Ka'u. I was raised there. There are high winds that are quite prevalent in the Ka'u area — the toxic wastes that may be released with the launches, will definitely affect air quality that is already being jeopardized by the current lava activity. No one can know or direct wind activity. Heavy launches — that may include nuclear payloads — can yet imagine what could happen should there be an ACCIDENT!!!

The Ka'u area has been attempting to encourage tourism because of poor cane production — the rocket launching facility would certainly discourage the allure of the area!!!

Name (Please Print) DORIS S. GRACE

Mailing Address P.O. Box 3073

City, State, Zip KAILUA KONA, HI. 96745

Telephone

11-94

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Doris S. Grace
P. O. Box 3073
Kailua-Kona, Hawaii 96745

Dear Ms. Grace:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-95

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

The DEIS is a comprehensive document, addressing all relevant issues. Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration event, a deflagration event, and accidental spills. In addition, a health risk assessment and an ecological risk assessment have been prepared.

The various analyses and modeling of impacts included in the DEIS are based on existing meteorological data and utilize eight different weather condition scenarios. Particular attention was paid to air quality, including possible synergistic effects with emissions from the volcano. All of the technical reports prepared for the DEIS will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 16 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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I AM TOTALLY OPPOSED TO THE PROPOSED ROCKET LAUNCH FACILITY, I WILL NOT ALLOW IT!

Name (Please Print) JAY HANSON

Mailing Address 78-6622 ALII DRIVE

City, State, Zip KAILUA-KONA HI 96740

Telephone 808-322-7268

11-96

November 7, 1989

Department of Business and Economic Development
Office of Space Industry
P.O. Box 2359
Honolulu, HI. 96804

Gentlemen:

I would like to get a copy of the testimony given at the public hearings given on the big island. Will you please advise me when it will be available? If it is available in a machine-readable format (diskettes for IBM PC), that would be preferable.

I would also like a list of the people who attended the meetings.

Please advise me of any reproduction charges.

Aloha,

Jay Hanson, Chairman
Friends of Kahaluu Beach Park
78-6622 Alii Drive
Kailua-Kona, HI 96740

322-7268

March 15, 1990

CH2M Hill

John Everingham

1585 Kapiolani Boulevard, Suite 1312

Honolulu, HI 96814

Dear Mr. Everingham,

As a reviewer of the EIS for the proposed Rocket Launch Facility, some issues have come to my attention that I believe need to be addressed in the EIS.

According to a story that appeared in the Honolulu Advertiser on March 5th, a report prepared by Nissho Iwai Corp. indicates the Japanese may be interested in using the proposed Hawaii Rocket Launch Facility. However, there are several "strings" attached to this interest.

If the State intends to use this report as economic justification to construct the proposed Rocket Launch Facility the following issues must be addressed:

1. The report was made predicated on the assumption that Titan-class launchers would be used. Since the State has ruled out these launchers, this heavy-lift capability must not be used to compute market interest.
2. That portion of Japanese interest requiring the use of their own rockets cannot be included in the EIS' economic justification, unless the technical data and environmental hazards of using them are also included. According to my information, the Japanese H-II is approximately twice as large as the Delta. The H-II has very large strap-on SRM boosters that could pose significant environmental hazards.
3. Furthermore, certain laws and regulations must be changed in order for Hawaii to be attractive to the Japanese. A complete discussion of these laws and regulations must be included in the EIS, along with the reasons that those laws or regulations are currently in place, and potential ramifications if they are changed.
4. The explosive social impacts of the Japanese coming to Hawaii to launch their own rockets must be addressed. For example, aren't the residents of Ka'u likely to resent highly paid foreigners moving into their neighborhoods and building luxurious houses? It would seem that the net effect of such a proposition would be to superimpose, on top of the present residents, a new upper class consisting of wealthy foreigners.

In other matters, your EIS preparation notice failed to mention the several models of the Atlas Rocket. It appears that the data presented is for the "Atlas-I/Centaur". Please include data on the "Atlas-IIAS/Centaur". This model of the Atlas uses solid rocket motors and has about 50% more lift than the Atlas mentioned in your notice.

Recent studies indicate significant amounts of aluminum chloride are produced by solid rocket motors; please address these environmental impacts in the EIS.

It has come to my attention that certain rockets and/or solid rocket motors use large amounts of asbestos for insulation. Please include studies on the release of asbestos into the environment during an on-pad catastrophe. In particular, address the hazards of airborne asbestos on nearby residents.

Finally, a recently completed Air Force safety study shows that when a main launch vehicle breaks up, there are significant hazards to bystanders from free-flying SRMs. In order to fully evaluate hazards to residents living next to the launch pads, the EIS must include studies of how far SRMs can fly alone and out-of-control. The EIS must include studies on free-flying SRMs for the Atlas-IIAS, Delta, N-I, N-II, H-I and H-II rockets.

Aloha,

Jay Hanson

78-6622 Alii Drive

Kailua-Kona,, HI 96740

cc. Russell Turcote

Russell Kokubun

Sierra Club Legal Defense Fund

Representative Virginia Isbell

Senator Andy Levin

Jim Morrow

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Jay Hanson
78-6622 Alii Drive
Kailua-Kona, Hawaii 96740

Dear Mr. Hanson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 3/15/90, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-98

The DEIS is a comprehensive document, addressing all relevant issues. Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration event, a deflagration event and accidental spills. In addition, a health risk assessment and an ecological risk assessment have been prepared.

All of the technical reports prepared for the DEIS will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 17 1989

Office of Space Industry
DBED

2409 Linda Line
Clarkston, WA 99403
November 12, 1989

Dear Messrs. Mead and Everingham:

We have recently received and reviewed the Environmental Assessment and Notice for An Environmental Impact Statement for a Master Plan for the Development of a Commercial Rocket Launching Facility dated September, 1989. As new land owners in the Ka'u District (in the Hawaiian Ocean View Ranchos), we wish to offer our comments on the above named document. I am currently employed as a Natural Resources Manager with the U.S. Army Corps of Engineers on the Snake and Clearwater Rivers in Washington and Idaho. In that role I am frequently called upon to review and comment on a variety of similar documents. I have a degree in Biology from Fresno State College and my wife minored in Biology at the same institution. My wife is currently a pre-school teacher and is working on an elementary teaching credential (she already has a secondary teaching credential). We hope our comments here will be of value as you pursue a course of action leading to development of a spaceport.

1. Call the facility a SPACEPORT for simplicity sake. It sure beats writing out "commercial rocket launching facility" every time you need to refer to it.

2. Page 7, LAND REQUIREMENTS--The last sentence of this paragraph brings up several questions:

a. Will wildlife habitat be enhanced, or left as is?

b. What recreational opportunities do you have in mind?

c. Would the possible agricultural uses impact the endangered/threatened species (plant or animal) that may be in the area?

d. If money is to be spent to mitigate for flora or fauna losses, might that money be better utilized to expand the boundaries of Hawaii Volcanoes National Park (HVNP) to protect that unique flora, fauna, and geology where the public would have better access for viewing/studying same? We are not suggesting that we write off any species, but rather if the same species can be provided for in or near HVNP, why not consolidate efforts where you can get the greatest return for efforts/dollars expended?

e. Have there been any studies done to evaluate the impacts of rocket launching and associated activities on species that inhabit the surrounding environment? We are thinking specifically of the Kennedy Space Center in Florida.

3. Page 7, SITE ACCESS--We would highly encourage the consideration of an on site barge dock for the following reasons:

a. To avoid the additional heavy traffic which would undoubtedly cause more rapid deterioration of Hawaii's major highway. Judging from what we observed this past summer, Hawaii's roads were not built to accommodate a frequent flow of traffic in the 30 to 40 ton range. Such activity would surely increase local costs for highway construction and repair.

b. To avoid having that traffic pass through a national park and other areas traveled heavily by tourists. Having worked in several of our national parks in the past, we know that tourists are not the most responsible drivers in the world while sightseeing in a new area and trying to enjoy the unfamiliar scenery. It would be best if they did not have to contend with heavy tractor-trailer rigs while trying to take in the sights.

c. To avoid having to haul chemicals, propellants, or other hazardous materials through populated areas or through HVNP. It would be best to avoid having to haul such materials through populated areas where an accident or spill could be very disruptive to a community. Some of these chemicals could undoubtedly cause damage to property and/or pose health and safety problems to the population. After only one such incident, the population of the whole Island of Hawaii could become disenchanted with the entire spaceport concept, causing considerable public relations problems for the spaceport operators. Also such materials could have a very severe impact on the unique environment of HVNP in the event of an accident or spill in that area.

d. You may already be aware that a regional airport is being planned in the vicinity of the proposed Hawaii Riviera Resort near Ka Lea (South Point). This airport would be only about a half hour drive from the two proposed spaceport sites rather than the hour and a half to two hour drive from Hilo. Use of this airport would keep activity away from the more populated Hilo area and would eliminate the need to haul materials through HVNP. It is also highly likely that this airport and an on site barge dock facility would have better weather to contend with throughout the year since they are both on the drier side of the Island of Hawaii.

e. In the unlikely event of a lava flow wiping out the main highway between Hilo and the spaceport, an on site barge dock would allow for shipments to continue arriving at the spaceport uninterrupted. Maybe this is not such an unlikely event since the road between Kalapana and the Kamoamoa Campground in HVNP has already been obliterated by a lava flow!

4. Page 7, WATER SUPPLY--In the case of the Hawaiian Riviera Resort, it has been proposed that excess water developed by the resort developers be provided to adjacent housing areas. Is this a possibility for the spaceport since there will probably be some support housing in the immediate vicinity?

11-99

5. Page 8, WASTEWATER COLLECTION AND TREATMENT--We think you have a great idea in wanting to use "sufficiently clean" wastewater to provide landscape irrigation. Although we've read much about people wanting to do this, we've not seen it done. This could be a pilot project to encourage others to do the same.

6. Page 8, FIRE, POLICE, AND MEDICAL SERVICES--Again, in the case of the Hawaiian Riviera Resort, the developers are at least considering providing these services to the community surrounding their development since many of their employees will be living there. Will the spaceport operators be required to do the same? It seems reasonable that they too should provide these services not only at their facility, but also in the nearby communities that their activities will impact due to their employees living in those communities.

7. Page 8, EMPLOYMENT--When the Hyatt Regency developed their resort at Waikoloa, it is our understanding that they brought in most of their employees from off the Island. The Hawaiian Riviera Resort developers seem to be trying to train some of the local population to run their facilities once they are operational. We are glad to see that you are also trying to plan for employment of some of the local population. Hopefully the local population will not be left to fill only the lowest level assignments, i.e., security guards, buildings and grounds maintenance workers, secretaries, etc. We would like to offer an idea that would possibly allow for more local employment. The spaceport operators could provide an interpretive facility which would:

a. Provide educational and interpretive services for the large number of visitors who would pass this facility on a daily basis. This would be an excellent way to inform the public of the need for space exploration/exploitation activities and to share the benefits that we all derive from these efforts. Many people are very naive about the actual and potential benefits that we can all have through continued exploration/exploitation of space.

b. If an interpretive facility could be designed so that a launch viewing area could be provided for the public, it would undoubtedly attract viewers just as the Kennedy Space Center does every time it launches a vehicle. Interpreters could be available to explain the launch process and to explain the nature of each particular launch (when appropriate).

c. This could be a very positive public relations program for the operators if well trained interpreters were hired to run this program. We have worked closely with a number of agencies who employ interpreters and it is our personal observation that you get what you pay for. It would be well worth the investment to hire professionally trained interpreters who have a variety of interpretive skills, i.e., good communications skills (both oral and written), the ability to design interpretive displays, and the ability to provide

professionally polished presentations to the public (whether in large groups or one-on-one). We would imagine interpretive training could be arranged through the University of Hawaii at Hilo if it is not already part of their academic curriculum. It might also be possible to obtain some interpretive advice and or training through HVNP.

d. Provide tours of the spaceport which could provide income to support the interpretive efforts. A gift shop would be another way to help support this program.

8. Page 8, EMPLOYMENT--It might also be appropriate for the developers of the spaceport to contact the developers of the Hawaiian Riviera Resort to coordinate training and work activities that both may be involved in for the next few years. Such coordination may help to keep some people employed longer by ensuring work for the local population over a longer period of time. Any training afforded the local population needs to be provided far enough in advance so that they can compete for meaningful employment rather than just the menial tasks.

9. Page 10, GEOLOGY AND TOPOGRAPHY--You mention that some areas "...grade down to the water's surface." Does this mean there may be usable beaches in the area or could beaches be developed at either of the sites? We understand that the shoreline may be rather difficult to reach in this area. However, there seems to be a dearth of beaches available on the Island of Hawaii. If beaches could be developed and safe easy access afforded them without excessive cost, we would like to see them developed. It would be understood that during some on site activities, some or all of the beaches might have to be temporarily closed from time to time. But it would be nice to have additional public access beaches available in the area.

10. Page 13, VEGETATION--By all means, provide adequate protection for any endangered plants present in the area.

11. Page 13, FAUNA--Again, by all means, provide adequate protection for any endangered/threatened wildlife species in the area. Perhaps this merely means that some of the launch pads should not be used during certain times of the year or that facilities should be developed in different areas within the spaceport site. It may even be possible to develop adequate habitat away from the centers of activity. It seems probable that the 100+ land owners and their activities at the Kahilipali Point site may already be more disruptive to these species than the potential spaceport activities would be.

12. Page 15, MODIFICATION OF LAND--Definitely take advantage of topographic shielding and use earth colors and textures liberally to lessen the visual impact on the area. The use of native species for landscaping would certainly enhance the site.

13. If water sources are adequate, agricultural leases might also help to enhance the visual impact of the area while adding

good use of the surrounding land not needed for direct support of the facilities/operations.

14. Every effort should be made to see that the local social and economic impacts on the area are not merely exploitive, but rather that they enhance the local communities and the Island of Hawaii in general. A little caring for the environment and the people that inhabit it will go along way in providing support for the facility both at the outset and during the years of operation to follow. The public definitely needs to be heard from during all stages of planning and development activities, as well as during the operational phase. The latter will ensure a continuing partnership between the operators and the local citizens.

We appreciate the opportunity to comment on this document and would very much like to have that same opportunity when the Master Plan and Environmental Impact Statements are ready for public review and comment. Please keep us informed of their availability and of any other opportunities to participate in the public review/comment process.

Sincerely,

Phillip L. Hixson

Shirley A. Hixson

Phillip L. Hixson &
Shirley A. Hixson

11-101

JOHN WAIH
Gover
MUFI HANNEMAN
Direc
BARBARA KIM STANTO
Deputy Direc
RICK EGG
Deputy Direc
TAKESHI YOSHIHA
Deputy Direc

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 19th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. and Mrs. Phillip Hixson
3409 Linda Lane
Clarkstown, WA 99403

Dear Mr. and Mrs. Hixson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/12/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You letter lists a number of issues. We believe that the DEIS addresses these issues is a comprehensive manner. In addition, all of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review. Please note that the DEIS focuses on Palima Point, the preferred site.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED
NOV 9 1989
Office of Space Industry
DBED

P.O. Box 1813
Kealakekua Hi. 96750
October 24, 1989

Governor John Waihee
State Capitol, Honolulu, Hi 96813

Dear Governor:

Aside from the unconscionable expenditures being made on military weapons systems, rocket launches included, I am seriously concerned, and I believe you should be as well, about the negative impacts a Big Island space port would have upon human health and the environment.

To begin with, we're already breathing dubious quality air primarily as a result of the on going volcanic activity of Kilauea about which we can do nothing.

However, with the welter of highly toxic emissions from proposed rocket launches, the stage is set for disastrous consequences upon our health and environment. Needless to say, this is totally at odds with the goals of an ecologically sustainable future.

Environmental degradation is far too often caused by misguided development strategies and military activities and it therefore makes eminent good sense to reject this significant risk to public health and the environment and we hope you will do so.

The risks far out-weigh the benefits.

What is needed now is a new environmental ethic; one based on global revival and sustainability rather than on Chamber of Commerce-propelled, public relations hype, in which land and resources are treated like commodities.

Cordially and sincerely
(Mr. + Mrs.) Philip C. Hoffman

c.c: John C. Lewin
" Rep. Shon
" Bruce Anderson
" Andy Levin
" George Mead

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGERT
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. and Mrs. Philip C. Hoffman
P. O. Box 1813
Kealakekua, Hawaii 96750

Dear Mr. and Mrs. Hoffman:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/9/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-103

You have raised a number of issues to be addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues. Particular attention was paid to air quality, including possible synergistic effects with emissions from the volcano. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

There will be no military launch vehicles launched from the proposed facility. Please note that on June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. This legislation, encoded as Section 201, Hawaii Revised Statutes, was enacted to regulate the payloads of space vehicles launched from within the territory of Hawaii. Section 201-75 of the Hawaii Revised Statutes reads: "any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source." This Act is a statement of the desire and intent of the State to use the commercial launching facilities for the peaceful exploration of space, and to prohibit those payloads which could cause harm or destruction.

Hawaii could launch commercial communication and scientific satellites as well as government weather satellites. Certain payloads related to the military could be

launched, including weather, communications, scientific, and navigation satellites. All payloads will be launched by commercial launch vehicles and launch operations will be controlled by the commercial operator.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

to the Department of Business and Economic Development

Please/ No Rocket Launch on the Big Island of Hawaii
I have lived 16 years here and have always done my Best To protect the Beauty and the life of This Island.

Name (Please Print) Kathryn V Jones

Mailing Address 77-6434 Sea View Circle

City, State, Zip Kailua-Kona 96740

Telephone 329-6093

11-104

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Kathryn V. Jones
77-6434 Sea View Circle
Kailua-Kona, Hawaii 96740

Dear Ms. Jones:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

The EIS should address the following issues: (1) Air quality in Kona. We are already choking on VOG, How can you consider adding to this tons of aluminum oxide, hydrochloric acid and carbon monoxide? Toxic chemical combinations of these additional pollutants with extant Vog in the presence of sunlight must be evaluated. (2) Acid rain and its impact on the forest watershed and agriculture. Howard Horiuchi of the State Forestry Division receives calls every day from Kona concerning the effects of the acid rain from volcanic emissions. (3) Impact of rocket emissions on groundwater and water catchment systems in Kona. The pH of the water in our tank measured 3.5 in November 1989. (4) Transportation and storage of hazardous materials, including the possibility of accidents involving radioactive materials (5) Geological instability of the area, including tsunamis and earthquakes. (6) Impact of reduced air quality on established industries such as tourism, sporting events & real estate. (7) Impact of rocket emissions on established agricultural, fishing, ranching and dairy industries. (8) Social impacts such as loss of shoreline access and evacuation of residents. Finally, an independent analysis of CH2M Hill by a reputable mainland firm with no military affiliation is essential. Considering the questionable work this organization presented in their EIS for the Puna irradiation facility, their qualifications to conduct a study of this magnitude and critical importance to our quality of life are indeed suspect.

OVER →

Name (Please Print) Dianne Keffer

Mailing Address P.O. Box 728

City, State, Zip Honaunau, HI 96726

Telephone 328-9789

JOHN WAIHEE
Governo
MUFI HANNEMANN
Directo
BARBARA KIM STANTON
Deputy Directo
RICK EGGER
Deputy Directo
TAKESHI YOSHIHARA
Deputy Directo

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Diane Keffer
P.O. Box 728
Honaunau, Hawaii 96726

Dear Ms. Keffer:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-106

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

You have raised a number of issues to be addressed in the DEIS. The DEIS is a comprehensive document, addressing all relevant issues, including potential effects on groundwater and water catchment systems; transportation, storage and handling of hazardous materials; geologic conditions; and social and cultural issues. Particular attention was paid to air quality, including possible synergistic effects with emissions from the volcano. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

LET IT BE KNOWN THAT I KEITH KEFFER VEHEMENTLY OPPOSE THE PROPOSED SPACE LAUNCH FACILITY. AS A 15 YEAR RESIDENT OF KEUKEA S COUNT I ~~HAVE~~ AM PAINFULLY AWARE OF THE DETERIORIS EFFECTS OF THE RECENT KYU ERUPTION OF KILAUEA FOR WEEKS ON END THE VOLCANIC EMISSIONS SIT OVER OUR AREA SEVERAL CLOSE FRIENDS HAVE BEEN FORCED TO MOVE & OTHERS ARE ON MEDICATION FOR RESPIRATORY AILMENTS AS A RESULT. ADD TO THIS THE EMISSION OF ALUMINUM DIOXIDE, DIRECTLY LINKED TO ALZHEIMERS DISEASE, TO BE ABSORBED TOPICALLY & INTERNALLY & THROUGH LOCAL FOOD SOURCES AND YOU CREATE A POTENTIAL ENVIRONMENTAL DISASTER WHILE THE STATE TAX STRUCTURE MAY BE SLIGHTLY ENHANCED YOU THREATEN THE LIVELIHOOD OF A MUCH BROADER SEGMENT OF OUR POPULATION BY DESPOILING THE PRISTINE BEAUTY OF THE ISLAND WHICH ~~THEY ARE~~ IS PRIMARILY RESPONSIBLE FOR THE TOURISM, BUILDING & AGRICULTURAL INDUSTRIES. LIKE MANY OTHERS I WOULD BE FORCED TO RELOCATE MY FAMILY IS THIS ill CONCEIVED PROJECT IS SHOVED DOWN MY THROAT

11-107

Name (Please Print) KEITH KEFFER

Mailing Address ~~RT~~ P O BOX 728

City, State, Zip HONAUNAU HI 96726

Telephone 328-9789

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. Keith Keffer
P.O. Box 728
Honaunau, Hawaii 96726

Dear Mr. Keffer:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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No Action is only safe action
Tell us the real reasons for this
Proposed C.R.L.F. and reasons, arguments and
fears against it will be obvious
Stop wasting time and money
Do something useful for Ka'u and Hawaii

Name (Please Print) Michael Keller

Mailing Address P.O. Box [illegible]

City, State, Zip Capt. Cook [illegible]

Telephone [illegible]

11-108

JOHN WA
Gov
MUFI HANNEMA
Dir
BARBARA KIM STAN
Deputy Dir
RICK EG
Deputy Dir
TAKESHI YOSHIH
Deputy Dir

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2400 Fax: (808) 586-2377

July 9, 1993

Mr. Michael Keller
P O Box 700
Captain Cook, Hawaii 96704

Dear Mr. Keller:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

DEC 1 1 1989

Office of Space Industry
DBED

AUGUST V. KLAUE
P.O. Box 14917
Spokane, WA 99214
509-928-9600

November 21, 1989

Dear Sir:

SUBJECT: "No Rocket Launch on the Big Island"

We are owners of property on the Big Island, near Pahala; and also on the Kona Coast.

Our family and friends have been enjoying the big island for the past 13 years.

We plead with you to use your influence in objecting to this development for obvious reasons.

Thanking you, I remain,

Very truly yours,

August V. Klaue

August V. Klaue

cc: Citizens with space concerns

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANT
Deputy Director
RICK EGGE
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

July 9, 1993

Mr. August V. Klaue
P. O. Box 14917
Spokane, Washington 99214

Dear Mr. Klaue:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/21/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 1 7 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

As a Kona Coffee farmer for the past fifteen years, I would vehemently oppose any commercial rocket launching facility on the big island. I feel it would impact greatly the production of the only coffee grown in the United States. In Kona, the inversion is so great, the volcano has enough of an impact. Can you imagine adding rocket exhaust to it. If a rocket launch facility is needed so badly, please consider buying Palmyra island (presently for sale) and put a rocket launching facility there.

Sincerely,

John Langenstein

Name (Please Print) John Langenstein

Mailing Address 84-4956 Mamalahoa Hwy

City, State, Zip Capt. Cook, HI 96704

Telephone 323-9486

11-110

JOHN WAI
Gov
MUFI HANNEMA
Dir
BARBARA KIM STAN
Deputy Dir
RICK EG
Deputy Dir
TAKESHI YOSHIH
Deputy Dir

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. John Langenstein
84-4956 Mamalahoa Highway
Captain Cook, Hawaii 96704

Dear Mr. Langenstein:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about air quality, including possible synergistic effects with emissions from the volcano on Captain Cook, is specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM 89 NOV 20 PM 4:24

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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I am opposed to a rocket launch facility on the Kau portion of the Big Island. The quality of our air would be adversely affected as there is an inversion factor on the Kona side of the Island of Hawaii. The volcanoes had greatly effected our air quality, we can do nothing about that. Please allow us control on this point. We can not stand more pollution.

Sincerely,

Penelope Langenstein

Name (Please Print) Penelope J. Langenstein

Mailing Address 84-4956 Mamalahoa Hwy

City, State, Zip Capt. Cook Hi 96704

Telephone 328-9486

RECEIVED

DEC 11 1989

Office of Space Industry
DBED

11-111

JOHN WA
Gov
MUFI HANNEM
Dir
BARBARA KIM STAN
Deputy Dir
RICK EG
Deputy Dir
TAKESHI YOSHI
Deputy Dir

STATE OF HAWAII 1959

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Penelope J. Langenstein
84-4956 Mamalahoa Highway
Captain Cook, Hawaii 96704

Dear Ms. Langenstein:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about air quality, including possible synergistic effects with emissions from the volcano on Captain Cook, is specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

I am opposed to the Rocket Launching facility on Hawaii because of pollution

Name (Please Print) Mary E. Lighty

Mailing Address 77-6385 Kenika Pl

City, State, Zip Kailua-Kona, Hawaii

Telephone 326-[illegible]

11-112

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

JOHN WA Gov
MUFI HANNEMA Dir
BARBARA KIM STAN Deputy Dir
RICK EGI Deputy Dir
TAKESHI YOSHIH Deputy Dir

July 9, 1993

Ms. Mary E. Lighty
77-6385 Kenika Place
Kailua-Kona, Hawaii 96740

Dear Ms. Lighty:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

NOV 17 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

I am totally opposed to the proposed rocket launching facility in Kau for many reasons. The rocket emissions pose many health problems. Also the location of the proposed site is ridiculous & unsafe. Why build a launch site so close to a volcano, where there are earthquakes?

Name (Please Print) STEPHANIE LIGHTY

Mailing Address 77-6385 KENIKA PL.

City, State, Zip KAILUA-KONA HI 96740

Telephone 326-4181

11-113

JOHN WAIH
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGI
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Stephanie Lighty
77-6385 Kenika Place
Kailua-Kona, Hawaii 96740

Dear Ms. Lighty:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concerns about air quality and geologic hazards are specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

VBM Virginia B. Macdonald AIA
Architect and Planner
(808) 967-7375

P.O. Box 47
Hawaii National Park
HI 96718

RECEIVED
NOV 28 1989
Office of Space Industry
DBED

State of Hawaii
Department of Business and Economic Development
P.O. Box 2359
Honolulu HI 96804

27 November 1989

Attn. Mr. George Mead
Office of Space Industry

Dear Mr. Mead:

I have read the Environmental Assessment and Notice Preparation for the proposed Commercial Rocket Launching Facility in the Ka'u District, Island of Hawaii. I also see that any comments should have been made before October 23, 1989.

I did not intend to comment. However, during the first week of November 1989, information came to me which is of such critical importance that I hope you will accept these late comments.

The chemical **hydrazine** is mentioned briefly on page 16 as "an aerosol resulting from an accidental near-pad spill or explosion." In seeking additional information from a medical doctor who is also a member of the College of Toxology (she is Janette Sherman, M.D. of Washington, D.C.), I found out the following:

•1. Some hydazene is always released during a blast off.

•2. Hydrazene also is released into the estimated 100,000 gallons of water used to cool the launch pad during each launch.

•3. Hydrazene has been known since at least 1902 to be a potent carcinogen. It is considered many times more toxic than asbestos.

•4. Hydrazene does not break down when mixed with water. While efforts are to be made to collect the water containing hydrazene and other chemicals (your page 8), much of it would percolate through the pourous lava substrate and into the ground water system.

•5.There is a case now in litigation against Martin-Marrieta, who build and test space launch equipment, in Denver, Colorado, brought by 14 families whose children suffered birth defects due to hydrazene. Some other effected children have already died; others have learning disabilities.

According to Dr. Sherman, unborn babies and children seem to be more at risk --but there are documented cases of cancer in adults who have worked near hydrazene, or drunk water contaminated by hydrazene.

Hydrazene is a known, documented cancer causing and birth defect causing agent.

How do you plan to keep hydrazene-contaminated water from entering the ground water and seeping into the nearby ocean?

Have studies been done on the effects of hydrazene on marine life? Or on the effect on humans who eat fish who swim in ocean water contaminated with hydrazene?

This information seemed so important to bring before you, that I hope you will accept it even though it has been sent post the deadline for comments.

Aloha

Virginia B Macdonald

cc: Governor, State of Hawaii
Council Members, County of Hawaii
Russell Kokubun
Merle Lai
Loraine Inoye
Helene Hale
Editors, Hawaii-Tribune Herald
Honolulu Advertiser
Honolulu Star-Bulletin

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGERT
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 15th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Virginia B. Macdonald
P. O. Box 47
Hawaii National Park, Hawaii 96718

Dear Ms. Macdonald:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-115

Some time ago, you offered comments (letter of 11/27/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration event, a deflagration event, and accidental spills. In addition, a health risk assessment and an ecological risk assessment have been prepared. Potential impacts on groundwater and water catchment systems are included. The various analyses and modeling of impacts included in the DEIS are based on existing meteorological data and utilize eight different weather condition scenarios.

The scenarios and assessments address hazards associated with hydrazine and other related chemicals used in launch activity.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

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OCT 1 2 1989

Office of Space Industry
DBED

OUR CONCERNS FOR THE PROPOSED ROCKET LAUNCHING FACILITY:

There are many environmental, social, religious & economic factors which we feel need to be explored. The following is a list of these potential problems and questions for a proposed Rocket Launching Facility.

The word "Spaceport" is a misnomer for this project because nothing will becoming "in & out" as the name implies. While a "Spaceport" sounds glamourous, we feel that the EIS should use "Proposed Rocket Launching Facility" or "P.R.L.F" which we will be used throughout the rest of this paper.

Flood Zone-
Repeated flooding occurs near mile marker 51 located in between the two proposed points where supplies would have to come through Hilo.

Wind-
Trade winds have been known to blow for up to 2 months with 25-30mph typical wind gusts.

A Wind Farm is located close to the points. It was chosen in its present location because it is one of the windiest areas. Also Kaalualu Bay is known as one of the best wind surfing areas in the world & the only wind surfing shop on this Island happens to be located right here in Naalehu.

We enjoy living in Mark Twain Estates mostly because the trade winds constantly blow and keep the mosquitos away as well as add the extra bonus to our many neighbors who generate their electricity from the wind.

The present atmosphere data collection station near Honuapo Bay is in an inappropriate location. All the data from that location should be considered as invalid and not representative of conditions of either of the proposed points. Local wind experts have characterized this location as a "dead-zone". Also, why wasn't this station built with building permits?

In the Safety Assessment Report of the 2 proposed launch sites, the report states that the amount of "meteorological data available for the proposed sites was limited." The tradewinds are such a large predominant and ongoing event in this area, it's hard to believe the conclusion of this report that both sites are acceptable from a safety stand point. We highly question the validity of this report and feel much more accurate research needs to take place.

Are these sites safe against hurricanes?

Volcanic & Earthquake Hazard Zone

This region is considered unsafe because this is the most active volcano in the world. We had an earthquake recently which reached 6.1 on the Richter scale.

Why has this volcanic and earthquake information been used against the development of the Hawaiian Riviera and seems to be disregarded in this P.R.L.F issue where it is even closer to the two sites and more problematic and dangerous to a rocket launching facility and populations?

Other Environmental Factors-
Ancient Hawaiian Artifacts exist throughout the area.

Frail & rare natural ecosystems need to be studied.

Local populations are at risk of rocket misfires and rocket launching emissions.

What are the pollutants and their effects to wildlife, insect & plant life, the marine environment, the fishing and dairy industries, the children, the elderly, and nursing pregnant & mothers?

What would be the effect of a rocket misfire with a cargo of nuclear payload material which the head of this project, Mr. Hayward, considers as an "acceptable and valuable cargo in any commercially viable R.L.F."? Please consider 3-4 different scenarios of where it might land or explode on the pad, in the ocean along the coast, in the town of Naalehu along the highway & Pahala respectively, a nearby mac-nut orchard, or on the side of Mauna Loa. What would be the toll on the environment and specifically on the tourist, dairy, sugar, mac-nut, fishing, honey, cattle, commercial, and real estate industries? What would be the relocation requirements and costs in each of these scenarios?

How will pollutants from the propellant emissions and the "vog" combine synergistically to pose new hazards to the environment?

What will the noise affect during construction, operation, and actual launching have on migrating whales and other migrating species? How will the noise affect the human population, and all the industries in the area?

What effect will the growth brought from this P.R.L.F have on the Ka'u community in terms of traffic, stress, crime, schools, pollution, and such facilities as the post office,police,fire, & hospitals, etc.? Who will pay for the needed facilities to accomodate this growth?

How will the related support activities affect the environment, economy, social & religious groups?

How will this affect Punalulu resort and its planned theme of"health and wellness"?

How will it affect the rural quality of life in Ka'u?

Economic Considerations-
How much money will this bring to the state? Who will this money go to?

What are the TRUE needs of an additional rocket launching facility in the world market? How many more are being planned and built throughout the world?

How many years will it take this P.R.L.F to become technologically obsolete? Could there be a better site to build a R.L.F. such as on an unpopulated Island?

What is the dollar value of having to relocate citizens or have them pack up their bags during the rocket launching?

Can the state require people to move off the land when it is going to be a privately owned and operated launching facility?

What will be the TOTAL infrastructure costs? Where will the funds come from? Why does the state complain about the infrastructure costs in the Hawaiian Riviera Resort Development where the developer is willing to cover the costs? We don't here the State complaining about the costs of the infrastructure for the P.R.L.F which makes us wonder whether the tax payers will have to carry this burden?

If this facility becomes technologically obsolete, where will the funds come from to maintain the infrastructure?

Is the State working with other launching technologies such as the "747 piggy back type" that has less environmental and damaging impacts?

What % of money generated will stay on the Island and in Ka'u?

What is the success rate of rocket launching facilities in recent history? We have heard of a recent explosion at a rocket launching facility.

How will this proposal affect the Hawaiian Homelands

This area has typically had affordable property. What will happen to land values?

DBED's "Environmental Assessment & Notice Preparation for an EIS for a Master Plan for the development of a commercial rocket launching facility" seems to be [illegible]

subdivisions of Green Sands, [illegible] Harbour from the U.S.G.S. map [illegible] they trying to make it look as if [illegible]

How much other mis-information has the [illegible] will continue to provide in this E.I.S?

What are the worst case scenarios economically, [illegible], and environmentally with this P.R.L.F?

Has the State looked into other development [illegible] for Ka'u? What would be the economic picture for a development based on diversified agriculture?

Is this proposed project a political favor that the [illegible] owes to someone?

What do the people of Hawaii County feel about this development, compared to other economic development [illegible] diversified agriculture based on [illegible] Sustainable Agriculture) techniques? [illegible] of HI. county be educated on all the [illegible] Will local farms who raise their crops [illegible] due to toxic emissions?

Let it be known that there are [illegible] this proposed rocket launching facility [illegible] have said they are willing to die before [illegible] go into operation!

Sincerely,

Scott & Margaret Martin.

DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7430250 HEDFED FAX: (808) 548-8156

October 30, 1989

Mr. & Mrs. Scott Martin
P. O. Box 721
Naalehu, HI 96772

Dear Mr. & Mrs. Martin:

Thank you for your recent request to be a consulted party for the preparation of an environmental impact statement for the proposed commercial rocket launching facility on the Island of Hawaii.

Enclosed for your information and consideration is a copy of the project environmental assessment. To ensure that the full range of issues and concerns related to this proposed action are addressed and all significant issues identified, comments and suggestions are invited from all interested parties.

Please note the State deadline for comments has been extended to November 7, 1989, however, because the Federal deadline for comments is November 17, 1989, any comments postmarked on or before November 17 will be considered in the Draft Environmental Impact Statement. Written comments should be addressed to DBED, P. O. Box 2359, Honolulu, Hawaii 96804, Attention: Mr. George Mead.

Thank you for your interest in the proposed commercial space launch facility.

Sincerely,

Roger A. Ulveling

Roger A. Ulveling

encls.

cc: CH2M Hill
DOT Office of Commercial Space Transportation

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Dear Mr. Mead.

We are concerned senior citizens who settled on the Big Island to live out our golden years.

The proposed Rocket Launch facility would endanger all forms of life. This hazardous event must not take place. The future of this beautiful island is at stake.

We must respect and maintain a high quality of life for every living being, be it human or otherwise.

Sincerely,
Eva Nelson
Joshua Nelson

Name (Please Print) Joshua + Eva Nelson
Mailing Address 73-1136 Olu Olu St
City, State, Zip Kailua-Kona HI 96740
Telephone 325-7795

11-119

JOHN WAIHEE
Governor
MURI HANNEMAN
Director
BARBARA KIM STANTI
Deputy Director
RICK EGG
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

General Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. and Mrs. Joshua Nelson
73-1136 Olu Olu Street
Kailua-Kona, Hawaii 96740

Dear Mr. and Mrs. Nelson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about the potential hazards associated with the proposed project are specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

See enclosed letter

Name (Please Print) NEILY NELSON

Mailing Address 77-1479 Seaview Circle

City, State, Zip Kailua Kona Hi 96740

Telephone 808 329 8446

11-120

11/16/89

Mr George Mead, Dept of Transportation

4 All parties with interest in the proposed commercial rocket launching facility, Kau Hawaii. First I couldn't think of a more unacceptable inappropriate location for this project. This beautiful & precious paradise (our island home) cannot stand a facility of this scope. That is plain common sense. We know of all the negative impacts this would have on the environment in this wilderness territory. It would be a purposeful destruction of paradise. The aina of the land must be upheld. Our pursuits should be tourism & agricultural sports directed. Why waste money on an EIS. We don't want this horrible project for our island. This project is environmentally unsound. Why do you want to do this? The island of Hawaii has a pristine & fragile ecology. The domain should be for people & the food we grow. Why tamper with Mother Nature, we have the knowledge about all the harmful effects of a project such as this

(1) Located on a very unstable area geographically.

(2) Extremely windy.

(4) We dont need jobs as [illegible] because most of the locals will be unqualified to do anything else
(5) Major rip off of the people that live here.

Dear Sirs, I have worked all my life to live in Kona and I love my island home & feel very strongly about protecting it. I will also be doing everything in my power to enlighten my neighbors about this [illegible] project. You & all the other govt. agencies involved will be scrutinized. The truth will not be [illegible]. Greed is a very ugly thing especially when it comes to ruining paradise. Election time will soon come again & you can be assured that those in the govt. that support this project will be turned out of office. There is a very strong contingency of environmentalists & conservationists that are deeply opposed to ~~[illegible]~~ this proposed launch facility.

Think about the air, water, earth

Neicy Nelson
In Protest

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Neicy Nelson
77-6479 Seaview Circle
Kailua-Kona, Hawaii 96740

Dear Ms. Nelson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/16/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about geologic hazards, meteorological conditions, and air and water quality are specifically addressed in the DEIS. The types of jobs that would become available and the qualifications of local residents for these jobs are also discussed. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

T. Yoshihara

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM 89 NOV 20 PM 3:42

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

I would like equal time in the EIS exploring the effects of no action in this situation. I have attended numerous public meetings in Kona, Naalehu and Pahala, and at every meeting the local populace stood up one by one to denounce the proposed state-commercial rocket launching facility in Ka'u. In every instance our concerns are pushed aside as "not important" "we're misinformed" or "just a vocal minority and a local issue." This is not just a local issue, it is statewide, and at this point in time we, as citizens are not being represented with what we desire for our destiny. We are a majority who say, tell us what it will be like for us if we, Native Hawaiians, may finally claim our homelands in South Point. Tell us how pure the air will be without manmade toxins. Tell the fisherman they will still fish and you tell us how the Green Sea Turtle, Humpback whale, Hawaiian duck, coot and others will still be seen. Address us, citizens of this island, and especially those

over

Name (Please Print) ROSEMARY NORTH, BJORN LINDER

Mailing Address 77-6434 SEAVIEW CIRCLE

City, State, Zip KAILUA-KONA, HAWAII 96740

Telephone 808-329-6093

RECEIVED

DEC 11 1989

Office of Space Industry

who live within the 'population control zone', tell us we may keep our constitutional rights intact, and how nice it will be not to have to leave home in the middle of the night for who knows how long.

The scope of no action in this instance should focus on Ka'u as a park, a preservation of our heritage, a wilderness of open space, an agricultural paradise, worthy to be developed as a world model of prosperity and peace for all.

JOHN WAIHEE
Governo
MUFI HANNEMANN
Directo
BARBARA KIM STANTON
Deputy Directo
RICK EGGER
Deputy Directo
TAKESHI YOSHIHARA
Deputy Directo

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 17th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Rosemary North and Mr. Bjorn Linder
77-6434 Seaview Circle
Kailua-Kona, Hawaii 96740

Dear Ms. North and Mr. Linder:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-123

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Please note that the DEIS focuses on Palima Point, the preferred site. A number of special surveys have been made of the Palima Point site, covering botanical resources; birds and mammals; and marine, anchialine and sea turtle resources. A detailed analysis of all potential impacts and recommendations for mitigating measures has also been completed and will be included.

In addition to the survey work performed at the site, an ecological risk assessment was prepared in cooperation with The Nature Conservancy's Hawaii Heritage Program and the U.S. Fish and Wildlife Service to consider potential impacts on vegetation and wildlife in the Ka'u Forest Reserve and along the transportation corridor from Hilo to Palima Point. The assessment will be included in the DEIS.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Dear Ms. Mead,

I am writing to inform you that I, along with many other Big Island residents, am against the construction and operation of a Rocket Launching Facility on our beautiful and fragile environmentally sensitive island.

Couldn't we do something which is more beneficial to the island and its people? Couldn't something more harmonious with the island be done?

Sincerely Yours,
Diana Ocean

Name (Please Print) DIANA OCEAN

Mailing Address P.O. Box 339

City, State, Zip Captain Cook HI 96704

Telephone (808) 323-3446

11-124

JOHN WAIHEE
Governor

MUFI HANNEMANN
Director

BARBARA KIM STANTON
Deputy Director

RICK EGGER
Deputy Director

TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Ms. Diane Ocean
P. O. Box 339
Captain Cook, Hawaii 96704

Dear Ms. Ocean:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

RECEIVED

JUL 7 1993

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Considering the current air pollution in Kona (due to the Volcano) I think it would be advisable to include air quality in Kona as part of the Environmental Impact Statement for the proposed Spaceport. Thank you.

Name (Please Print) LINDA HOLMES PEEBLES

Mailing Address P.O. BOX 1418

City, State, Zip KEALAKEKUA, HI 96750

Telephone 322-8020

11-125

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Linda Holmes Peebles
P O Box 1418
Kealakekua, Hawaii 96750

Dear Ms. Peebles:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about air quality, including possible synergistic effects with emissions from the volcano on Kealakekua, is specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

STATEMENT ATTACHED

Name (Please Print) DAVID C. PENN

Mailing Address PO BOX 62072

City, State, Zip HONOLULU, HAWAII 96839

Telephone 808-948-7781

RECEIVED

89 NOV 21 PM 5:00

DEC 1 1 1989

Office of Space Industry
DBED

1989 November 17

United States Department of Transportation
Attn: Randy Repcheck
400 7th St. S.W.
Washington, D.C. 20590

WRITTEN STATEMENT ON ENVIRONMENTAL IMPACT STATEMENT PROCESS
PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY
KA'U, HAWAI'I

Introduction

The environmental impact statement process (EISP) is one facet of the environmental impact assessment process (EIAP). This process, is it usually proceeds in the United States and Hawai'i, is commonly misunderstood, misinformed, and misleading. I hope that behind your solicitation of critiques of EISP lies a desire to improve the process and its utility not only for the project in question, but for all aspects and applications of EIAP, from the laws guiding them to the hypocricy evident in the fact that EIA is not required of American firms operating ouside of U.S. territory. Moreover, I hope that you already have the ability and a well-strategized plan to make these improvements at all levels of the process, since it always a messy operation to collect information without prior knowledge of how it can be used. Indeed, one of the major concerns of speakers at the Honolulu scoping meeting was "how will our comments be used?" The answers given indicated that although good intentions were the motivating factor, there is currently no detailed plan for incorporating citizen's suggestions in a systematic manner as a means of attaining well-defined objectives.

Although there has been a plethora of research and literature published since the mid-1970's about how to improve the environmental assessment (EA), these concepts have seldom been applied to actual work in the field, especially in Hawai'i. Therefore, one of the objectives of EIAP must to be to reveiw these concepts and methodologies with regard to their applicability applied to the project in question. A good starting point is a 1978 book edited by C.S. Holling entitled Adaptive Ebvironmental Assessment and Management (Wiley and Sons: New York). Other works are referenced at the end of this statement.

However, since all of the documents thus far circulated concerning the project restrict their focus and orientation to run-of-the-mill EA work, this critique begins within that framework. Nonetheless, in order to make the EIAP for this project worthwhile, subcontractors and research plans must be specified in advance and open to public review prior to the

commencement of actual draft EIS (DEIS) related research. Citizens have extensive knowledge and experience in a wide range of areas concerned with EA, which should be used in formulating these plans. This will help to ensure that the results respond to citizen concerns and EIS legalities in the most responsible manner possible, and will help to eliminate later battles over the adequacy of research assumptions, methods, applications, and results.

I. Critique of the Environmental Asesssment and Notice Preparation (EAANP)

p. -1-
PART I: INTRODUCTION
CHRONOLOGY

"The August 1987 report Arthur D. Little, Inc.,... recommended that Hawaii take initial steps to develop space launch facilities..."

There appears to be a word missing between "report" and "Arthur."

This chronology begins at least 6 years behind the times. I became a Ka'u resident in 1981. At that time, Hawaii had already taken initial steps to develop space launch facilities. Paying Arthur D. Little, Inc. to make their 1987 recommendation was a waste of taxpayer's money. The (DEIS) must include a complete financial accounting of all State and County funds thus far expended for the proposed project, pending budget proposals, and projections of future expenses (over the life of the proposed project). Include in the (DEIS) a complete chronology of State and County interest in developing space launch facilities, including references to statements made by public and private officials in official correspondence, public appearances, press releases and other news media, legislative hearings, and other matters of public record. Also include a complete legislative history of pertinent bills, acts, resolutions, budget items, ordinances, etc., enacted, killed, or proposed, as well as a chronology of all permits, licenses, approvals, etc. that have been applied for, granted, denied, or withdrawn to date of publication. Further critiques of the OCST Safety Assessment and the Arthur D. Little, Inc. studies appear towards the end of this statement.

p. -2-
"...(OCST) will serve as the joint-lead agency in the preparation of a Federal EIS..."

OCST is not an appropriate joint-lead agency, as they have a special interest in the proposed project ("...to encourage, facilitate, and promote the establishment of a competitive U.S. commercial space transportation industry.") which might prejudice both their administrative actions and their assessment activities. The U.S. Environmental Protection Agency (EPA) is probably the most appropriate federal agency to oversee the EIAP.

The State of Hawaii Department of Business and Economic Development (DBED) is not identified in the EEANP as the other joint-lead agency. However, it is also inappropriate for the same reasons noted above. The State of Hawaii Office of Environmental Quality Control (OEQC) is probably the most appropriate State agency to oversee the EIAP.

p. -3-
PART II: DESCRIPTION OF THE PROPOSED ACTION
PROJECT DESCRIPTION

"Land ownership on both sites is a mix of State and private land."

What exactly is the mix? How much State land? How much private land? What does such a mix imply? Does the proposed project have a potential for changing this mix? What would such a change imply?

Concerns over land ownership are not limited to the proposed project site. Any EA of the proposed project must acknowledge and examine linkages between the site and the surrounding areas.

"Continuing studies as part of the planning process will result in the designation of a preferred site."

What are the parameters for such designation? What criteria will affect preferences, and how will they be measured? To what extent will public comment, existing land use, planning, and zoning regulations, land ownership, legislation, and special interests affect this designation?

"...Permit applications will be prepared by DBED."

Include a list of all permits, licenses, etc. required (at all governmental levels, with contact addresses for the parties responsible for approval) for the proposed project, including citations for the laws and regulations pertaining to each. Include a "flow chart" of the permitting process, with a chronology citing the results of permit activity to date and a timetable for future activity.

"It is envisioned that the State will acquire and/or control the land located within the population control zone boundary."

How would this be accomplished? At what expense to taxpayers? What kinds of controls would be imposed? What would be the

implications of State ownership/control of these lands?

"The population control zone (PCZ) is an area ... from which non-essential personnel would be excluded during launch operations."

The use of "personnel" imples that only a group of launch-related employees would be excluded. What about the general public?

How would this exclusion be implemented? How would the public be notified? What roads would be closed, and where? For how long? How would ocean traffic be controlled? What would be the implications of excluding people from an area where they gain their economic, emotional, and/or spiritual livelihood? How would the public be compensated for having their right-of-entry to and subsequent enjoyment of and benefit from the area denied?

"Population control zones as shown on Figures 2 and 3..."

Figure 2: Why does the curve of the proposed PCZ flatten to fall conveniently makai of Highway 11? What is the degree of confidence in this line? If the PCZ was found to extend mauka of what would be the implications of creating a PCZ over it? How would this affect plans to nominate Highway 11 as a Federal Scenic Highway? How many people live within the proposed PCZ? How many people live at regular increments of distance from the PCZ? How many residential properties exist within the propsed PCZ and these adjoining areas? How many people will live in these areas throughout the life of the project? How many people use the proposed PCZ? How often? For how long? For what purpose? To what benefit? How would these use patterns change over time if people were not exluded? If they were excluded? Why does the proposed PCZ stop at the shoreline?

Figure 3: See comments for Figure 2. Also, how much area of Hawaiian Home Lands is within the proposed PCZ? What would be the implications of creating a PCZ in an area set aside by the Federal government for homesteading?

Include complete documentation of safety analysis for PCZ delineation in the DEIS.

"The land on which the facilities lie would probably be leased to a private company or international consortium who would build and operate the facility."

What would the terms of such a lease be? How would the lease be offered? Would the State or the lessees have to carry liability insurance for the property? How much and at what expense? What private companies and consortia are being considered as lessees? Which have expressed interest in the proposed project?

In the DEIS, list all companies and consortia (with contact addresses) which may have interests in the proposed project, and reference all correspondence received and transmitted (and other negotiations conducted) to date.

"A Master Plan for the launch complex is currently being prepared."

CH2M Hill is not identified in the EAAN as the Master Plaaning firm. What was the process for selecting the master planning firm? What qualifies the chosen firm to do this kind of planning? What consultants will be used for what phases of the work, and what experience do they have in this kind of planning? How much will it cost?

Ensure that the Draft Master Plan is available to the public before DEIS research begins, so that formulation of the DEIS research plan can be based on detailed project plans and can include responsible public input.

LAUNCH VEHICLES

Include complete technical references and performance records for all launch vehicles.

DELTA
p. -3-, -4-

"The Commercial Delta II ... is the latest in a series of Delta rockets which have been operational since 1960. As of 1988 the Delta had successfully transported over 170 ... satellites into space. Between 1977 and 1987 there was only one failure out of 47 Delta launches."

Do the last two sentences refer to all Deltas or to the Commercial Delta II only? Does the second sentence refer to the entire period 1960-1988? How many Delta failures out of how many launches occurred between 1960 and 1977? Do these figures include test launches and military launches? Do they refer to U.S. launches or worldwide launches? Where did the failures occur? Under what conditions? What was their impact? What agency or company was responsible for each of these failures?

ATLAS/CENTAUR

No performance records cited. Include a complete summary of performance like that outlined above for DELTA.

SCOUT

No performance records cited. Include a complete summary of performance like that outlined above for DELTA.

FACILITIES
p. -5-

"Hazardous materials are handled and stored to minimize risk of accident."

Include a complete list of all the hazardous materials (propellants, oxidizers, fuels, igniters, pressurized gases, solvents, cleaning agents, etc.) that would be stored onsite. How much of each material would be onsite at a given time? For each material, include:

-active ingredients

-manufacturer

-technical reference to all user's manuals, manufacturer's instructions, etc.

-reference to all existing and proposed laws, regulations, guidelines, etc. governing the purchase, transport, handling, storage, use, and disposal of the material

-detailed plans of the proposed transport, handling, storage, and disposal facilities, and documentation of the risk analysis [illegible] and other methods used to design them

-documentation of transport, handling, storage, and disposal procedures that would be employed, and of the risk analysis procedures and other methods used to design them

-documentation of the training that would be given to employees who handle the material, and technical description of any protective equipment involved

-history of the material's use, including incidence of accidents, mishandling, or failure to comply with regulations; documentation of observed environmental impacts for normal, accidental, and mis-use; comparative records of company and agency safety performance with the material

-analysis of situations typically leading to accidental or mis-use, and documentation of contingency plans for dealing with potential problems at the propose site

NUMBER OF LAUNCHES

The preliminary estimates of the number of annual launches given tell a very different story from that expounded by some local politicians, who speak of tens to hundreds of satellites that are waiting to be launched. This section of the EAAN confuses market projections with launch projections and needs to be clarified. What share of the market would the proposed project capture? What assumptions is such a projection based upon?

"If the market for commercial launches expands significantly in the next ten years..."

The Governor's Symposium on Space reported that the market for small payloads is yet to be determined. Yet this section of the EEANP suggests that it can be determined. What is the probability of market expansion? How is it determined? What if the market doesn't expand? How is expansion of the market linked to construction of the proposed facility?

How would launches be scheduled? Which uses would take priority? How would these priorities be determined? Many human activities within the proposed PCZ are conducted with little or no advance planning- if conditions are right, it's time to go. How would people be compensated for loss of opportunity to use the proposed PCZ, particularly the ocean, shoreline, public lands, and other areas traditionally accessed for constitutionally-protected activities?

p. -6-
PUBLIC SAFETY

"Standards for the safe operation of launch facilities are established in a number of regulations and manuals..."

This entire body of information must be referenced and made accessible to the public for evaluation of the Draft Master Plan, and prior to the beginning of DEIS research.

"...safety buffer zones are established to protect the public from injury."

What other buffer zones would be established in addition to the proposed PCZ and the flight safety corridor? Include complete documentation of the assumptions and analytical methods used to delineate these zones, and reference the pertinent laws, regulations, ordinances, guidelines, etc.

"An abnormally functioning vehicle may be destroyed..."

How would the public be notified of impending destruction?

p. -7-
LAND REQUIREMENT

This section seems to imply that no residences would be aallowed within the proposed PCZ. What would be the costs and impacts of relocating people living within the PCZ? What would

be the costs and impacts of replacing the available residential land within the proposed PCZ? What would be the implications of prohibiting habitation on land set aside by the Federal government for settlement (Hawaiian Home Lands)? In scheduling launch activity, which uses would take priority? Why?

SITE ACCESS

"...an onsite barge dock could be considered..."

Is it being considered? If so, what would its construction, operation, and maintenance entail? Would it be available for non-launch related dockings? How often? At what cost to the public?

"Access to the site by road would be by State Highway 11."

What would be the time, density (number/size of vehicles), frequency and duration of these accesses? How would they affect existing and projected traffic patterns? Traffic safety? Noise levels? Air quality? Enjoyment of Volcanoes National Park and other scenic areas? Would they require escort vehicles, road closures, or other public expenditure? How would they hasten road deterioration and affect highway maintenance costs? Would any special conditions be imposed upon these accesses? Would any special fees be charged?

Reference laws, regulations, ordinances, etc. pertaining to these types of transport, and include a complete history of transport and traffic safety for this type of transport (accidents, conditions, impacts, parties responsible, etc.). Document contingency plans for dealing with transport accidents.

WATER SUPPLY

"Wells would be developed..."

Give complete technical information for planned wells.

"Existing wells in the vicinity indicate that ground water is sufficiently abundant to meet this requirement."

Give complete technical references for this statement.

"...water will be required at each pad for emergency wash-down and fireflow requirements."

What would the runoff from such wash-down or fireflow contain? Where would it go? With what effects? Would non-emergency washdowns also be required? How often, and with what results?

p. -8-
WASTEWATER COLLECTION AND TREATMENT

Reference the pertinent State Department of Health regulations and the offices/persons responsible for their enforcement. How would conformance with the regulations be monitored? How would industrial process waters be monitored? Quantify the amount of wastewater and its composition. Give complete technical references for all treatment facilities and procedures, including sludge treatment and disposal in the continental U.S. Which contractors would be used and what are their safety records?

FIRE, POLICE, AND MEDICAL SERVICE

"Mutual aid agreements would be developed with local fire, police, and medical services as necessary."

What form would these agreements take? Would they increase the current capability to service the general public? At what cost? How would public services be dispatched during launch operations? With what effects? Would launch operations preempt the availability and use of these services by area residents?

EMPLOYMENT

"Estimates for permanent personnel requirements are currently being developed..."

What about temporary employee requirements? Where would the people come from? Where would they stay? How much would they earn? How much would they spend? How much would they cost to service?

"The launch facility would employ people with a wide variety of skills, many of which could be filled by people in the community."

Quantify the number of jobs and give the training and skills required. How many unemployed people in the community have these skills? Do they want to work for the proposed facility? Would employed people want to change jobs to work at the proposed facility? What would be the opportunities and requirements for advancement (specify training programs, educational assistance, seniority requirements, personnel policies, etc.). Would advancement require relocation away from Hawai'i?

p. 10
PART III: DESCRIPTION OF THE ENVIRONMENTAL SETTING
THE REGION

"Population density in Ka'u is estimated at 4.74 people per square mile."

What is the population density within the proposed PCZ and at increments of distance beyond it? What is the population density in Pahala and Na'alehu? What are the population projections for these areas?

GEOLOGY AND TOPOGRAPHY

"About one-fourth of the Palima Point site lies ... in a zone characterized by relatively high risk of lava overflow when compared to the remaining area of the site."

What is the absolute risk in both of these areas and how was it calculated?

p. -11-

"The risk of lava overflow is generally lower at Kahilipali Point..."

What is the absolute risk and how was it calculated?

"The tsunami inundation zone at both sites..."

What is the risk of tsunami inundation at both sites and how is it calculated?

"Both sites are located in U.S. Geological Survey Seismic Zone 3."

What is the definition of Seismic Zone 3 and how was such designation made?

CLIMATE

"A meteorological monitoring station was installed ... midway between the two potential launch sites."

When and how was it installed? At what elevation, exposure, etc? How is the station monitored and data evaluated? What equipment is used? What are the time intervals for data aggregation, storage, and analysis? Climate in Hawai'i can exhibit enormous spatial variation over very small distances. To what extent do [illegible] the monitoring site match those at the proposed launch sites, and how well can the data collected predict climatic processes at the proposed launch sites?

AIR QUALITY

"The trade winds carry emissions from the active Kilauea volcano toward the sites. This results in elevated levels of sulfur dioxide and particulates."

This section fails to address the variability of emissions from Kilauea. The summary of air quality monitoring given on p. -12- fails to assess what portion of each recorded value is attributable to emissions from Kilauea, and what portion may be attributable to other sources.

WATER AND FLOODING

"Heavy rains could result in heavy flooding of some areas on both sites."

What amount/rate/duration/intensity of rainfall is required to produce what degrees of flooding? In what specific areas?

"Ground water appears to be abundant, based on yield of nearby wells."

Give complete technical references concerning these wells.

p. -13-
VEGETATION

"A vegetation survey will be conducted..."

What type of survey, over what area, for how long? Surveys which merely inventory species present at a particular place at a particular time are not very valuable for environmental assessment. What is more important is an understanding of the ecological relationships and key links among species in the community, and the effects of environmental disturbances upon these linkages and the resultant ecosystem structure and function. Numerous straight-forward techniques exist for this kind of analysis, but are rarely included in EIAP.

FAUNA

The purposes of and methodologies for evaluating and investigating fauna, as stated in this section of the EAANP, are poorly defined.

The hydrological dynamics of the Hoonoua Wetland must be carefully explored to determine the potential impact of ground water withdrawals, alterations in surface and subsurface runoff, erosional and sedimentation patterns, and exposure to toxic wastes that would result from the proposed project. These processes affect the coastal environment in non-wetlands as well.

POPULATION AND LAND USE

"The 1980 census is the most recent population data available ... The 1980 population was..."

Cite population projections for the area over the life of the proposed project.

"Nearby Punalu'u Resort accommodates up to about 400."

The Resort is slated to expand. How does this affect population?

"The Palima Point Site is uninhabited and undeveloped. It is in open space, macadamia nut farming, and grazing use."

Macadamia nut farming and grazing require land development. The area is not "undeveloped" where these uses occur. Many other uses occur at the site, and would be affected by the proposed project. How?

"The Kahilipali Point site is predominantly used for grazing."

Many other uses occur at the site, and would be affected by the proposed project. How?

"...ownerships on the site, including Hawaiian Homelands."

The Hawaiian Homes Commission Act of 1920 requires that Hawaiian Home Lands be used solely for the benefit of the the Native Hawaiian beneficiaries of the trust. How would the proposed project fulfill this requirement?

p. -14-
RECREATION

"Access to the shoreline portions of Palima and Kahili Point is difficult;"

This is an inappropriate value judgement. Many people who use these areas do not consider access difficult, and even enjoy making the trip.

"...hiking, shoreline fishing, limu gathering, and opihi picking take place at both sites."

Many other actuvities take place at these sites as well. How would they be affected by the proposed project?

p. -15-
PART IV: SOME POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

Mitigation is an unwholesome term defining a process which requires people to compromise their most honored traditions, values, and legal rights. It seems that nowadays there is a way to mitigate every impact, with the result that every impact-generating activity becomes acceptable. How is it determined that the mitigation technique itself is acceptable? What are the effects of mitigation upon the public?

MODIFICATION OF LAND

"Further studies are planned to evaluate the visual impacts of the project."

What kind of studies? Performed by what organization, with what qualifications, through what selection process? At what cost to the taxpayers? Outline the study parameters, the criteria to be used in the evaluation, the methods for evaluating them, and the standards to be met.

EXISTING AND PROPOSED INFRASTRUCTURE

"Potential impacts ... will be evaluated."

How? By what organization, with what qualifications, through what selection process? At what cost? Outline the study parameters, the criteria to be used, analytical methods, and measures of performance. The scope of work for these types of DEIS research must be submitted for public review prior to the commencement of the work, perhaps as part of the draft Master Plan.

AIR QUALITY

"... combustion products...are...unlikely to exist in concentrations which would affect the health and safety of the public (OCST, 1988)."

Does the OCST reference quantify the unlikelihood and document the risk analysis techniques used? The references listed in the EAAN (p. A-8) show several OCST documents published in 1988. Which one is cited here? Future references must follow conventional practice, such as OCST 1988a, OCST 1988b, etc., so that pertinent information can be readily located.

Under what conditions would these concentrations be more likely to exist? What would be done to prevent these conditions from occurring?

p. -16-

"Computer modeling using worst case wind conditions..."

What are these conditions and their frequency, duration, and time of occurrence?

"In the case of an accidental near-pad spill or explosion... a vapor could might result."

What would the magnitude of such a cloud be? Its chemical constituency and physical characteristics? Its quantified risk to public health and safety?

"Operations that pose such risks will be conducted only during times when meteorological conditions favor rapid dispersion to below toxic levels."

Define these conditions. How frequently do they occur, and for how long do they persist? How far in advance of actual launch would the determination of favorable or unfavorable conditions be made? How would the public be notified? What would be the possibility of conditions changing to unfavorable between the time favorable conditions are determined and ignition/lift-off?

"Air quality will be continually monitored...to ensure rapid detection and response to elevated levels of potentially hazardous vapors."

Give detailed plans and specifications for the monitoring network. What parameters would be monitored, based on what criteria? What standards would be enforced? Outline contingency plans for responding to elevated levels of potentially hazardous vapors.

NOISE

p. -17-

"Noise modelling will be conducted as part of further studies."

How? By what organization, with what qualifications, chosen through what process? Outline the model parameters and the criteria upon which modelling would be based. What standards would have to be met? How would noise impacts be evaluated? Would noise reduction techniques be used to alleviate noise effects?

SAFETY

"'...there have been no launch operations accidents that have produced any public casualties outside any of the Government Launch facilities,' ... (U.S. Department of Transportation, 1988)."

How many public injuries have been produced outside any Governemtn launch facilities? Under what conditions? How could they have been prevented?

How many public or other casualties have occurred within Governement launch facilities? Under what conditions? How could they have been prevented?

Public safety is not measured only by accident and casualty rates. What other public health and safety effects have resulted from launch operation accidents? Why? How could they have been prevented?

According to the EAAN's list of references, the U.S. Department of Transportation published several references in 1988. Which of these is referred to here?

"...there is a comprehensive set of safety procedures and regulations governing every aspect of the launch process."

Include complete references for these and make them accessible for public review prior to the commencement of DEIS research.

p. -19-

"An impervious barrier could be installed..."

What would prompt a decision to install it? How effective would it be? What problems would it induce? How would they be handled?

"A dike could also be built around the edge..."

What would prompt a decision to build it? How effective would it be? What problems would it induce? How would they be handled?

"Operational procedures would also be developed to minimize the release of toxic substances."

When would they be developed? They must be included in the draft Master Plan, and be availble for public review prior to the commencement of DEIS research. Are they in addition to the "comprehensive set of safety procedures and regulations" cited on p. -18-? If so, then the set cited is not comprehensive.

WATER AND FLOODING

"A drainage and flood study of the project will be conducted."

How? By what organization, with what qualifications, selected through what procedures, at what cost? How would potential impacts be assessed? What parameters would be assessed, defined by what criteria, using what methods and measures of performance?

"...mitigating measures (will be) recommended."

What would be the impacts of these mitigating measures?

"...the necessity of flood mitigating measures would be determined."

Would the nature of these measures be defined and their impacts evaluated? How?

"Studies will examine the potential effect of project-related substances on groundwater resource in the project area...and mitigating measures for minimizing advers effects will be recommended."

What would be the effect of these mitigating measures?

MARINE ENVIRONMENT

Anchialine Ecosystems

"A field survey will be conducted to locates the potential anchialine habitats... Quantitative and qualitative underwater biological surveys will be taken.. "

What survey methods would be used? Mere location of anchialine ponds and population counts yield minimal information for EA. Waht environmental parameters other than biological would be surveyed? For how long? With what degree of confidence in representing long-term conditions? Analysis must also consider connections with populations and ecosystems outside of the proposed project area. These comments also apply to ecological analyses in other environments listed and not listed in the EAAN.

"Based on ... the modeling described in the section on water quality."

There is no section of the EAAN named "Water Quality," or specificall dealing with water quality, and no description of water quality modelling in the section on water [illegible]. Give [illegible] description of the modelling procedures that would be employed.

"...mitigating measures will be developed."

Anchialine ponds are one of Hawai'i's most unique and most endangered ecosystems. Mitigation of environmental impacts will have consequences almost as serious as the impacts themselves.

The same goes for mitigation of impacts upon endangered and threatened species and flora and fauna.

ARCHAEOLOGICAL RESOURCES
p. -21-

"...a management plan for archaeological resources, including recommendations for preservation and interpretation of significant sites."

How is significance defined? By whom? Usually much too narrowly, and by people who do not belong to the race which created it. All sites are significant, and all would be directly affected by the proposed facility.

ECONOMIC IMPACT ANALYSIS

"The analysis will address...net economic benefits to residents of the island of Hawaii."

Such benefits cannot be presumed. An objective analysis should first seek to discover if there would indeed be net costs or net benefits.

SOCIAL IMPACTS

This is almost always the weakest section of any EIS. In this case, there are many difficult issues to wrestle with. One of the most important issues is, given that there are no State or County statutes, ordinances, policy statements, land use district designations, zoning, etc. explicitly supporting the development of space launch facilities at the proposed Ka'u sites, and that the overwhelming majority of citizens testifying about the proposed project are opposed to it, the implementation of such a project would represent a gross abuse of executive and bureaucratic power by government officials, and already represents a misuse of public funds. This abuse of the democratic process has serious social implications and impacts upon political life, and could serve as a precedent for further abuse.

The Hawaii State Plan (Hawaii Revised Statutes Chapter 226:10) "Objectives and Policies for the Economy" includes no specific mention of [illegible] such activities under the paragraph "Potential Growth Activities." A March 1989 report on State Plan Priority Guideline Implementation also fails to mention space launching-related activity.

The Hawaii County Plan Section I, "Development Priorities," lists only four kinds of development- resort, agricultural, fishing, and sugar. Section XIII, "Industrial Development," lists only the following desireable facilities: manufacturing, processing, wholesaling, large storage and transport, power plant, government boneyard. Section III, "Goals," includes the goal to maintain or improve the existing environmental quality of the island. The proposed project cannot contribute to this goal.

Nonetheless, elected representatives and other officials at all levels of government have been spending enormous sums of money to push the proposed project down the public's throat. At the Governor's Symposium on Space, Sen. Matsunaga emphasized that that the Governor made initiated and made commitments to Hawaii's evolution as a space technology center. But there is no explicit public policy guiding his actions in lobbying for the proposed project. Sen. Matsunaga also stated that the EIS could pave the way for the proposed project. This is a misconception of the planning process, which traps the public into believing that that EISP is the first step in planning. Public frustration at being excluded from the earlier stages of the process was evident in their remarks at the EIS scoping meetings.

The DEIS must address these political concerns.

"mitigation and management actions will include a discussion of job education and training needs."

This is an extremely narrow focus, since the proposed project would employ an extremely small number of local people. What other actions would be required?

"Native Hawaiian concerns will be adrressed through consultation with Hawaiian leaders."

What would be the framework for addressing these concerns? Would they be acted upon or merely noted?

p. -23-
PART V: ALTERNATIVES

Offshore floating platforms and aircraft-based launches are not realistic alternatives. It would be a waste of money, time, and effort to consider them in EIAP.

p. A-4
Table 2
AGENCIES...TO BE CONSULTED...
State

Include Department of Land and Natural Resources, State Land Use Commission, University of Hawaii Water Resources Research Center, UH Institute of Geophysics

II. Critique of the 1989 OCST Safety Assessment of Two Proposed Hawaii Launch Sites, with respect to the Environmental Impact Statement Process

p. 1
CHAPTER 1
BACKGROUND
Analysis

"Independent safety analyses were performed..."

Does this mean that the analyses were not performed by OCST?

p. 3
Evaluation Criteria
Geographical Location of Proposed Launch Sites:

"Placement of a site at lower latitudes...improves orbital performance, which may have a bearing on public safety."

What bearing on public safety has it had to date? Cite public safety statistics for launches from various latitudinal

positions, including the degree of confidence in assuming correlations between position and safety factors.

p. 9
CHAPTER 3
ASSESSMENT OF THE LAUNCH SITE FACTORS
Geographical Location of Proposed Launch Sites

"From a safety perspective, launches from sites near the equator...enhance(ing) the overall mission safety."

To what degree would mission safety be enhance when launching form the proposed sites? Quantify in terms of a decreased risk of failed vehicle performance.

p. 19
Site Size, Population, and Separation Distances

"As shown above, launch sites coexist with a variety of other interests without adverse safety consequences."

Evaluation of safety cannot be limited to launch accidents and other obvious parameters. The DEIS must summarize environmental impacts observed within and surrounding the continental facilities described, and discuss the ways these impacts have been managed. Include references to published accounts of these impacts and other environmentally-focused studies performed within the areas.

"the populations near the proposed launch sites are significantly less than those found near CCAFS and VAFB."

Does this have any quantifiable effect on public safety?

p. 20
OCEAN/MARINE TRAFFIC
Hawaii

"Local fishermen in small boats use the areas immediately offshore form the proposed sites, however, such activity is reported as infrequent."

This statement, based on a pilot chart of the north Pacific, is inaccurate and neglects local knowledge. A wide variety of vessels use these areas, including small fishing boats, large commercial fishing boats, pleasure boats, interisland barges, and cruise ships. During certain periods when migratory or seasonal fish inhabit these areas, boat launching from Kaulana Bay and Punalu'u, and associated fishing, is very frequent.

considered in the final evaluation of potential environmental impacts.

The OCST Assessment reproduces mauch of the information found in the [illegible] reports. Did taxpayers pay twice for the same information? I find it hard two believe that two independent teams of analysts came up with exactly the same results in so many instances.

Thank you for this opportunity to comment upon the EIS process for the proposed space launching facilities.

David C. Penn
P.O. Box 62072
Honolulu, Hawai'i 96839

1989 December 21

State of Hawaii
Office of Environmental Quality Control
Dr. M. Miura, Director

RECEIVED
'89 DEC 21 P12:28
OFC. OF ENVIRON. QUALITY CONTR.

Dear Dr. Miura,

Attached please find a copy of my recent letter to the U.S. Department of Transportation Office of Commercial Space Transportation (OCST). I became a Ka'u resident in 1981, and have followed the spaceport issue closely since that time, as both a concerned citizen and a student and professional in water management and environmental/land use planning. The concerns which I submitted to OCST are detailed and extensive, and are available to you upon request.

Thank you for your attention.

David C. Penn

David C. Penn
University of Hawaii at Manoa, Department of Geography
2424 Maile Way, Porteus 443
Honolulu, Hawai'i 96822

1989 December 21

Norman C. Bowles
Associate Director for Licensing Programs
Office of Commercial Space Transportation
U.S. Department of Transportation
400 Seventh St., S.W.
Washington, D.C. 20590

RECEIVED
'89 DEC 21 P12:28
OFC. OF ENVIRON. QUALITY CONTR.

Having received your letter of November 29, 1989, acknowledging receipt of my written comments concerning issues to be addressed in the EIS for the proposed commercial rocket launching facility on the island of Hawai'i, I am worried about the meaning of your reply that my concerns "will be taken under advisement during the development of the the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized."

The thrust of my previously submitted comments is that the community must have opportunities to participate in designing and conducting the research required for preparing the Draft EIS, before such studies actually begin. This is the best way to assure that community concerns are addressed throughout the development of the EIS, and will help to avoid later misunderstandings and conflicts over Draft EIS results.

I believe that I echo the concerns of many other citizens in contending that much of the EIS work completed in Hawai'i has been directed at "going through the motions" via a series of cursory and virtually meaningless baseline surveys which do not even begin to address the complexity of our ecosystems and their responses to environmental disturbances.

A large body of scientific knowledge about how to best conduct environmental assessment now exists, but has rarely been applied in Hawai'i. The proposed commercial rocket launching facility is a big project, and warrants our utmost diligence is assessing its potential environmentatl impacts. Therefore, I am very concerned about the manner in which my previously submitted concerns will be "takern under advisement," and I want to ensure that the community will be solicited for more input before the Draft EIS-related research begins. After all, aren't we taxpayers the ones fundung all of these studies? We have a right and a duty to review who will perform them and how they will be performed, and not to be relegated to taking potshots at a mysteriously completed report.

Thank you for your timely response to my submittal.

David C. Penn

David C. Penn
University of Hawaii Department of Geography and East-West Center
Environment and Policy Institute
2424 Maile Way, Porteus 443
Honolulu, Hawai'i 96822

cc: Hawai'i County Council
State Rep. J. Chang
State Sen. A. Levin
Rep. D. Akaka
Sen. S. Matsunaga
Sen. D. Inouye
University of Hawaii Environmental Center
State of Hawaii Office of Environmental Quality Control

JOHN WAIHEI
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2404 Fax: (808) 586-2377

July 9, 1993

Mr. David C. Penn
P O Box 62072
Honolulu, Hawaii 96839

Dear Mr. Penn:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-139

Some time ago, you offered comments (letters of 11/17/89 and 12/21/89, copies enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your long and thoughtful list of concerns on potential environmental, social, and economic impacts of the proposed project have been addressed in the DEIS. In addition, all technical appendices explaining the assumptions used in the modeling and analyses will be available for public review so that their validity may be examined and questioned.

Please note that a DEIS is a disclosure document, not a decision document. Its purpose is to assist decision-makers, including the residents of Ka'u, the Big Island and the State, in deciding whether or not the proposed commercial satellite launching facility is an appropriate land use at Palima Point, the preferred site.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Mr George Mead
Executive Director
Dept. of Business & Econ. Dev.
PO Box 2359
Honolulu - HI - 96804

RECEIVED
OCT - 6 1989
Office of Space Industry
DBED

5 Oct 1989

Re. EIS for Commercial Launch Complex Kau

Dear Mr Mead,

I want to be a consulted party for the above EIS.

I would like to see addressed the following:

(1) What measures will be taken to preclude military use of this launch complex?

(2) What are the dangers of becoming a target in case of a nuclear war?

(3) If becoming such a target, what is the spread of precision of existing enemy missiles or otherwise phrased. How large an area might be affected?

Thank you

Henry A. Ross
P.O. Box 99
[illegible]

11-140

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX 7430250 HIDPED FAX: (808) 546-8156

October 11, 1989

Mr. Henry Ross
P. O. Box 99
Kapaau, HI 96755

Dear Mr. Ross:

Thank you for your recent request to be a consulted party for the preparation of an environmental impact statement for the proposed commercial rocket launching facility on the Island of Hawaii.

Enclosed for your information and consideration is a copy of the project environmental assessment. Please note the deadline for comments has been extended to November 7, 1989. Written comments should be addressed to DBED, P. O. Box 2359, Honolulu, Hawaii 96804, Attention: Mr. George Mead, with a copy to CH2M Hill, 1585 Kapiolani Boulevard, Suite 1312, Honolulu, Hawaii 96814, Attention: Mr. John Everingham.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Roger A. Ulveling

Roger A. Ulveling

encls.

cc: CH2M Hill
DOT Office of Commercial Space Transportation

Mr George Mead
Executive Director
Dept of Business & Ec Dev.
P.O. Box 2359
Honolulu HI 96804

7 Nov 1989

Re. EIS for a Commercial Launch Complex in Kau

Dear Mr Mead,

I would like to see the following questions answered in the EIS:

1 Why should sites on Oahu not be considered also, a good and safe site there is Makapu Point. And further Palmyra Island?

2 Cape Canaveral has a safety radius of 7 miles, why is 3 miles for us enough? Or was that number determined to fit a preselected location

3 On page 15 of the assessment nitrogen is mentioned as a combustion product, why not instead mention nitrates oxides?

4 What will be done to guard against fly by night operators or dilettants?

5 Will the abort mechanism be a [illegible]

6 Apart from light pollution (page 22) would you also address particulate pollution as detrimental to most telescopes.

7 Who is going to police these launch activities? We all know that people have a habit of cutting corners and there should be stringent supervision by government agencies.

8 What are the real benefits for the Island of Hawaii with worst scenario use of a spaceport? Such as sporadic or intermittent use versus a permanent and continuous operation?

Regrettably I cannot make copies here, would you please forward a copy of this letter to CH2M Hill

Thank you for your kind attention:

Henry Ross
P.O. Box 99
[illegible] HI 96750

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street, 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Mr. Henry A. Ross
P. O. Box 99
Kapaau, Hawaii 96755

Dear Mr. Ross:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 10/5/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-142

Your concern about safety, potential effects on astronomy, and economic benefits to residents of the Big Island are addressed specifically in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

NOV 7 1989

Office of Space Industry
DBED

November 3, 1989

(Department of Business and Economic Development)
(Office of Space Industry)

To whom it may concern:

I would like to comment on the issue of the proposed commercial launch facility.

I have tried to weigh the pros and cons of the issue and came up with many negative feelings. There are so many questions that need to be answered in a realistic manner.

For example, I am very concerned about the safety for the people in the District of Ka'u. There are already enough volcanic fumes in the air and by launching missile, it would add more to the problem of being a health hazard.

Also, how can we be sure that a missile will travel on course and not veer toward the wrong direction? Also, in the event an explosion should occur, it could be disastrous for the people.

Everyone makes mistakes and no one is perfect as we all know. Having the launch facility that very close to the Ka'u people allows no room for even a very minor mistake. Too many lives would be in jeopardy.

I know that the land is barren and it seems like its a good target for you but, just up the street, only a few miles away, are people that live there. You would be intimating their detection

Also, there are enough earthquakes and volcanic activity that still exists today, whether it may be visible or not. There are enough environmental factors to be concerned with already. How can we be sure that the ground for the proposed facility would be strong enough to hold such an activity like so? Picture Example: Hawaii Business magazine, November 1989 issue (pages 38-39). Observe at how the Ka'u District is being identified with. I rest my case.

You might say that only a few times would you ever launch a missile. But it would be few times too many. We can't afford that risk.

Also, you might say, that for economical reasons the launch facility could open up a lot of employment for the people of Ka'u. Show me what kind of jobs would be available and how much of the Ka'u population would actually get the job. I would think that with a major scientific project like this, the space industry would already have selected the majority of the employees other than the people of Ka'u.

I am not against economic growth for Ka'u as long as it benefits the people most of all. But a launch satellite who benefits from this?

In my opinion, I would prefer the launch facility to be built somewhere else where it would not be of any threat

to people at all. I am sure with your knowledge and background, you can be able to come up with a better solution.

Whoever decides on whether to have a launch facility in Kau please try putting yourself in the shoes of the majority of the Kau people.

Do not arrive at the final decision for political reasons or whatever they may be.

Make your decision from within your heart as an individual should.

In closing, I would strongly recommend that the people of the District of Kau should have the very last say and vote on whether they want a launch facility there. The majority shall win. Fair is fair. If the majority says "yes," say no more. If it is "no," say no more. It is simple as that. I am sure that you would want the very last say also if a launch facility was to be built in your hometown. Wouldn't you?

Thank you for reading my comments and for giving me the opportunity to do so. I would appreciate it if you would reply or give me some feedback on the issue.

Thanks again,
Mary Lou Shirai
2100 Date St. #2403
Hon. HI 96826

11-144

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Mary Lou Shirai
2100 Date Street #2403
Honolulu, Hawaii 96826

Dear Ms. Shirai:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/3/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

The DEIS addresses the concerns that you have expressed on safety and the economic and social costs and benefits of the proposed project for the residents of Ka'u. Please note that the DEIS is a disclosure document, not a decision document. It provides information on the expected impacts of the proposed project. Its purpose is to assist the decision-makers, which includes the community, to make the decision on whether the project will or will not be built.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

ENVIRONMENTAL IMPACT STATEMENT PROCESS
PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

89 NOV 27 AM 10: 37

RE: Kahilipali Point Rocket Launching Site

There are many areas of scientific concern which must be examined thoroughly in order to ensure that the site is safe from a geological standpoint.

Areas to be addressed:

What are the negative implications of the following?

1) The Waichinu Fault Line runs near the site. Scientists generally agree that this was the center of the 1868 earthquake which was approximately 8.0 magnitude and virtually destroyed all of Ka'u. It was reported that every European building in the district was destroyed. It caused a huge tidal wave and mud slide which buried about 500 animals and 31 people. The road at Waichinu was offset 4 meters.

2) This is an unstable area frequented by earthquakes.

3) This is an area of subsidence - a place where land rises and falls often during earthquakes.

4) This is a tidal wave prone area.

5) Type of land...How unstable is the area with lava tubes, cinders, a'a lava, pahoehoe lava, cracks, etc.?

Please address ALL these areas. Any one of them could adversely affect a rocket launch site.

How much more dangerous is it to have a rocket facility in an area where ALL of these conditions exist?

Jim and Martha Simpson
P.O. Box 13
Naalehu, Hawaii 96772
808-929-7351

RECEIVED
DEC 1 1 1989
Office of Space Industry
DBED

11-145

ENVIRONMENTAL IMPACT STATEMENT PROCESS
PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

89 NOV 27 AM 10: 37

RE: Palima Point Rocket Launching Site

There are many areas of genuine scientific concern which must be examined thoroughly in order to ensure that the site is safe from a geological standpoint.

Areas to be addressed:

What are the negative implications of the following?

1) How will the proposed site be affected by being situated in the Southern Rift Zone of Kilauea Volcano.

2) The site is at the end of The Great Crack.

3) This is a very unstable area and is rocked by frequent earthquakes.

4) This is a lava flow prone area. Historical lava flows are very near the site.

5) Is this an area of subsidence? - a place where land rises and falls often during earthquakes.

6) Tidal Waves - Is this a tidal wave prone area?

7) Flood plain area

8) Type of land...How unstable is it with lava tubes, cinders, a'a lava, pahoehoe lava, cracks, etc.?

Please address ALL these areas. Any one of them could adversely affect a rocket launch site.

How much more dangerous is it to have a rocket launch facility in an area where ALL of these conditions exist?

Jim and Martha Simpson
P.O. Box 13
Naalehu, Hawaii 96772
808-929-7351

RECEIVED
DEC 1 1 1989
Office of Space Industry
DBED

ENVIRONMENTAL IMPACT STATEMENT PROCESS
PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

89 NOV 27 AM 10: 36

Re: Palima Point and Kahilipali Point Rocket Launching Sites

Concerns to be examined in preparing the EIS's

How will the proposed rocket launching activity adversely affect the Endangered Humpback Whales' breeding and calving? (e.g. Noise, lights, water pollution, air pollution, general activity, etc.)

How will the proposed rocket launching activity adversely affect the Endangered Hawksbill and Green Sea Turtles feeding and resting areas? (noise, lights, water and air pollution, general activity, etc.).

WATER

Since this activity takes a tremendous amount of water and Ka'u is known for its droughts, who is going to develop and finance the water source?

Who will pay for the delivery of this water and how will it be transported to the site?

After the water is used and dirtied...How will it be contained? How will it be cleaned? How will it be disposed of? How will the pollutants be disposed of? How will seepage be prevented? How will the water table be protected? How will the ocean waters be protected?

FUEL STORAGE

Where will the fuel be stored? How much more will it cost to make a safe fuel storage containment system? Is it possible to construct an earthquake, fault-zone, lava proof fuel storage tank?

What size safety area is needed for a fuel storage system located on a geologically unstable site...as opposed to those storage facilities which are presently built on relatively stable ground?

How will this fuel be transported to the site?

Jim and Martha Simpson
P.O. Box 13
Naalehu, Hawaii 96772
808-929-7351

RECEIVED
DEC 11 1989
Office of Space Industry
DBED

ENVIRONMENTAL IMPACT STATEMENT PROCESS
PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

89 NOV 27 AM 10: 36

Concerns to be addressed by Environmental Impact Statement(s):

There should be two (2) separate environmental impact statements - one for each site (i.e. Palima Point and Kahilipali Point).

Palima Point is located on Kilauea Volcano, the most active volcano in the world, with its unique set of conditions.

Kahilipali is located on the slopes of Mauna Loa Volcano with equally unique conditions.

Each site demands that a separate EIS be done to address all aspects of this rocket launching endeavor. If this (2 EISes) is not done, then each site will not be given the thorough, in-depth, serious research that is required by an EIS.

Jim Simpson
P.O. Box 13
Naalehu, Hawaii 96772
808-929-7351

RECEIVED
DEC 11 1989
Office of Space Industry
DBED

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGER
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. and Mrs. Jim Simpson
P O Box 13
Naalehu, Hawaii 96772

Dear Mr. and Mrs. Simpson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-147

Please note that the DEIS focuses on Palima Point, the preferred site. Your concern about geologic and other natural hazards, fuel storage and handling, water supply and water quality, and potential impacts on humpback whales are specifically addressed in the DEIS. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Recently there has been much attention given to the conservation of Hawai'i's endemic species ($750,000 grant to Leonard Freed of UHM, Susan Brown's Hawaiian Hawk Project (UHH)). It seems contradictory for the state to be on the one hand supporting these worthwhile projects while on the other supporting Spaceport/Geothermal, etc. that could destroy these animals' environments and lead to their extinction. That the Geothermal project endangeres many forest birds is well known, but also at the proposed Spaceport sites are found the endangered Green Sea Turtle, the Hawksbill Sea Turtle, Koloa (H. duck), Gallinule, Coot, and Stilt. Also the Hawaiian bat, the only mammal endemic to Hawai'i, is found at these proposed sites. These animals (with the possible exception of the bat) are already endangered; to further endanger them runs the risk of driving them to extinction. In the environmental assessment for the spaceport we read of "mitigating measures" to prevent potential adverse impacts on these animals (P. 20), but we are not told what those mitigating measures might be. As was reported in the Honolulu Advertiser some time back, the last of a species of thrush that lived in a marsh near Cape Canaveral, Florida, became extinct when the marsh was drained for launch activities.

Name (Please Print) Jim Snyder

Mailing Address 82 Mala

City, State, Zip Hilo Hawaii 96720

Telephone 959-4777

Other concerns I have about the proposed Spaceport facility are possible accidents (as was recently reported, a rocket launched by the American Rocket Co. ~~recently~~ blew up at Vandenburg Air Force Base, California), and toxins produced by launch activity. On p. 19 of the environmental assessment we read of containment measures for these toxins, but again we are not told what these measures might be, and it is doubtful that any containment measures would hold up in such a volatile Earthquake Zone as the proposed sites.

We are in a Global Environmental Crisis. Part of that crisis is our continued militarization of our planet. With 'Star Wars' tests on Maui, the possibility of military use of the proposed Spaceport is very real.

This Global Environmental Crisis should serve to unite all humankind for our own survival, the survival of other species, and of our planet itself. We humans like to imagine ourselves on top of the evolutionary ladder of life (which is not true; life is an interconnected web) and that we are caretakers of Earth. Let us begin to accept this role. For all of the above listed reasons, the Spaceport facility should not be built. As Harvard biologist E.O.Wilson said, echoing John Donne, "Everytime we allow a species to go extinct, it diminishes us."

Jim Snyder

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

General Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax: (808) 586-2377

July 9, 1993

Mr. Jim Snyder
82 Malia
Hilo, Hawaii 96720

Dear Mr. Snyder:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

11-149

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

A number of special surveys have been made of the Palima Point site. The surveys include botanical resources; birds and mammals; and marine, anchialine and sea turtle resources. A detailed analysis of all potential impacts and recommendations for mitigating measures has also been completed and will be included. In addition, an ecological risk assessment was prepared in cooperation with The Nature Conservancy's Hawaii Heritage Program and the U.S. Fish and Wildlife Service to consider potential impacts on vegetation and wildlife in the Ka'u Forest Reserve and along the transportation corridor from Hilo to Palima Point. The assessment will be included in the DEIS.

Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration event, a deflagration event, and accidental spills. The DEIS discloses all potential adverse impacts to human health and the ecology.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

University of Hawaii at Hilo

HAWAII COMMUNITY COLLEGE
GENERAL EDUCATION AND PUBLIC SERVICES DIVISION

RECEIVED
OCT - 9 1989
Office of Space Industry
DBED

MR. GEORGE MEAD
EXECUTIVE DIRECTOR
DBED
P.O. BOX 2359
HONOLULU, HAWAII 96804

DEAR MR. MEAD,

I would like to be a consulted party for the upcomming HAWAII COMMERCIAL LAUNCH COMPLEX EIS.

Thank you for your attention.

Lani Stemmermann

11-150

HILO, HAWAII 96720-4091 • TEL: (808) 961-9421

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7430250 HIDPED FAX: (808) 546-8156

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

October 11, 1989

Ms. Lani Stemmermann
University of Hawaii at Hilo
General Education and
Public Services Division
Hilo, HI 96720-4091

Dear Ms. Stemmermann:

Thank you for your recent request to be a consulted party for the preparation of an environmental impact statement for the proposed commercial rocket launching facility on the Island of Hawaii.

Enclosed for your information and consideration is a copy of the project environmental assessment. Please note the deadline for comments has been extended to November 7, 1989. Written comments should be addressed to DBED, P. O. Box 2359, Honolulu, Hawaii 96804, Attention: Mr. George Mead, with a copy to CH2M Hill, 1585 Kapiolani Boulevard, Suite 1312, Honolulu, Hawaii 96814, Attention: Mr. John Everingham.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Roger A. Ulveling

Roger A. Ulveling

encls.

cc: CH2M Hill
DOT Office of Commercial Space Transportation

RECEIVED

OCT 31 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Let the San Francisco Geyser be a lesson. The Big Island is too small to sumber directions. Don't the active volcano with its vog and the frequent shakes, have enough to indicate we need nothing else as reminders?

Hawaii Maritime believes it's a sad fact, time now have, why can't our legislature let alone with the already active volcanic and fiscal problems?

There are many anti reasons — but the tourist trade and landowners need more — they only look their pocketbooks.

Name (Please Print) Doris M. Thompson

Mailing Address 75-5782 Kuakini Highway Apartment #307

City, State, Zip Kailua, Kona, HI 96740

Telephone 329-5003

11-151

STATE OF HAWAII 1959

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WAI Governor
MUFI HANNEMANN Director
BARBARA KIM STANT Deputy Director
RICK EGGE Deputy Director
TAKESHI YOSHIHARA Deputy Director

Central Pacific Plaza, 220 South King Street, 17th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

July 9, 1993

Ms. Doris Thompson
75-7582 Kuakini Highway #307
Kailua-Kona, Hawaii 96740

Dear Ms. Thompson:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the concerns raised in your letter.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Scoping Comments file

MAILING LIST ADDITIONS/COMMENTS

If you received the attached Fact Sheet by mail, you are already on the DBED mailing list. If not, and you would like to have your name added to the list for future mailings, please complete the address from below and mail to the Department of Business and Economic Development, Office of Space Industry.

Please Print

Name RICK VIDGEN

Agency/Organization MAC FARMS

Street STAR ROUTE ~~PO~~ Box 25

City CAPTAIN COOK State HI Zip 96704

Phone 328 2435

Your comments, suggestions or questions about this proposed project are welcome.
We would also appreciate letters if you have more extensive comments.

(1) HOW CAN YOU COMMENT ON AIR QUALITY WHEN THE BASE DATA (ex. AMER. LUNG ASSOC) IS FOR LESS THAN 1 YEAR AND COLLECTION WILL CEASE IN JUNE?

(2) IT IS OBVIOUS THE SIGNIFICANT EXPANSION OF KAU POPULATION WILL AFFECT THE KAU — KONA ROAD USE.

WHAT PLANS DO YOU HAVE TO UPGRADE THIS ROAD?

11-152

90:017-07

Hawaii Space Development Authority
Office of Space Industry

JOHN WAIHEE
GOVERNOR

THOMAS B. HAYWARD
CHAIRMAN & SPECIAL ADVISOR TO THE GOVERNOR

GEORGE MEAD
EXECUTIVE DIRECTOR
OFFICE OF SPACE INDUSTRY

January 31, 1990

Mr. Rick Vidgen
General Manager
MacFarms of Hawaii
Box 25 Star Route
Captain Cook, HI 96704

Dear Mr. Vidgen:

Thank you for your letter of December 22 sharing your views on the proposed rocket launching facility. You raised several points which I would like to respond to.

Firstly, we have made many efforts to keep the community informed on the development. This has been accomplished by public meetings and distribution of printed information on the project. During the environmental impact statement scoping/consultation process, five scoping meetings were held and over one thousand environmental assessments and notices of preparation for the project were distributed to the public. This was done to ensure that the full range of issues and concerns related to the project have been identified and will be addressed in the EIS.

The air quality issue was identified through our scoping/consultation process as one of major significance, particularly to those in the Kona coast region. We are continuing to monitor baseline ambient air quality from Honuapo and will obtain data from the American Lung Association which has established an air quality monitoring program in Captain Cook. Additionally, the State Department of Health will initiate its own air quality monitoring program and expects to install a station in the Kona area within a matter of weeks. Air quality modelling will be performed as part of the EIS studies to assess the potential effects of rocket launches, both on a regional and island-wide basis.

The environmental impact statement will also include a thorough examination of transportation issues. Areas to be addressed involve highway safety, highway and bridge loadings, highway capacity, and mitigative improvements. The scope of these studies will be closely coordinated with recommendations received from the Federal Highway Administration, who will also be reviewing the draft EIS.

CENTRAL PACIFIC PLAZA, 220 SOUTH KING ST., SUITE 840, HONOLULU, HAWAII 96813
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TEL: (808) 548-3451 FAX: (808) 548-8156

I appreciate your comments on the project and hope this information alleviates any uncertainty you might have felt with respect to the EIS adequately addressing the issues of air quality and highway transportation. Should you have any further questions or concerns regarding these or any other issues, please feel free to contact me. We look forward to receiving your comments on the draft EIS.

Sincerely,

for George Mead
Thomas B. Hayward

bcc: The Honorable John Waihee
Gov. Ref. No.: 90:017-07

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

SEE ATTACHED SHEET

Name (Please Print) PETER A WALDAU

Mailing Address P.O. BOX 4717

City, State, Zip KAILUA-KONA, HI 96745

Telephone 808 326 1353

Isolation, genetic mutation, and adaptative radiation have resulted in the unique flora of the Hawaiian Islands. Nearly 97% of native plants are found no where else on earth. In 1975 the Smithsonian Institution reported to Congress that 40% of the species and varieties of Hawaiian plants were endangered or extinct. The extinction rate of Hawaii's flora is alarming. At least 255 species are thought to be extinct. Since the European presence in Hawaii, plants have become extinct about once every nine months. As one pre-eminent botonist succinctly assessed the situation:"...there have been more animal and plant species extinguished in the Hawaiian Islands than in the entirety of North America."

Endangered species and habitats epitomize the degradation of our environment. I am concerned about the impact of the proposed spaceport facility on the endangered Sesbania tomentosa a beautiful shrub with salmon colored pea-shaped flowers. This plant known as Ohai is making it's last stand on the Big Island at South Point. Please address the impact of the space launchings on this population. Hydrochloric acid is known to damage foliage but there is a more subtle and far greater concern. Tropical soils are nitrogen limited. Soils on the Big Island with aluminum may possess nitrogen bound up in forms unavailable for plants. Dr. Tamini, an expert on the dynamics of soil fertility, is with HITAHR and the Beaumont Lab at the University of Haewaii at Hilo. He feels this aluminum may be the cause for immobilizing nitrogen in Hawaii's already nitrogen poor soils. The effects of aluminum from the launching fallout on South Point's plant-soil nitrogen dynamics must be assessed.

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

General Pacific Plaza, 220 South King Street, 17th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2400 Fax: (808) 586-2377

July 9, 1993

Mr. Peter A. Waldau
P O Box 4717
Kailua-Kona, Hawaii 96745

Dear Mr. Waldau:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

11-155

A detailed analysis of all potential impacts on human health and the environment and recommendations for mitigating measures has been completed and will be included in the DEIS. Both an ecological risk assessment and a human health risk assessment have been prepared and will be included in the DEIS.

Accident scenarios have been developed and a hazard assessment performed for releases of toxic substances, fire, and explosion. They address storage and handling of hazardous materials, a conflagration event, a deflagration event and accidental spills. The DEIS discloses all potential adverse impacts to human health and the ecology.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

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NOV 1 7 1989

Office of Space Industry
DBED

P. O. Box 713
Kamuela, Hawaii 96743
November 14, 1989

Mr. George Mead
Office of Space Industry
Department of Business & Economic Development
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Mead,

I live on the Big Island and have yet to hear the good news about the proposed spaceport here.

Where is the labor force coming from for this highly technological endeavor? Not the Big Island - probably the mainland. The housing problem is bad enough now. Bringing in mainland personnel will drive rental prices even higher, putting the local population at even more of a disadvantage than already exists.

The pollution fallout from launch vehicles would do irreparable damage to the fragile ecosystem of all the islands, particularly the Big Island.

And what of the vibrations from such launches? They are going to aggravate the already tenuous Big Island position vis a vis earthquakes, volcanic eruptions and tsunami.

There is no prestige or sense in damaging the environment and exacerbating the already poor economic conditions on the Big Island.

I appeal to you to reconsider placing the proposed spaceport in the Hawaiian Islands. I see no advantages, only harm, to the land and the people.

Sincerely,

Jacqueline Wright

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2400 Fax (808) 586-2377

JOHN W
Gov
MUFI HANNEM
Di
BARBARA KIM STA
Deputy Di
RICK EG
Deputy Di
TAKESHI YOSHI
Deputy Di

July 9, 1993

Ms. Jacqueline Wright
P. O Box 713
Kamuela, Hawaii 96743

Dear Ms. Wright:

Subject: Environmental Assessment and Notice of Preparation of an Environmental Impact Statement for Development of a Commercial Satellite Launching Facility, Ka'u District, Island of Hawaii

Some time ago, you offered comments (letter of 11/14/89, copy enclosed) to the Department of Business, Economic Development and Tourism regarding the proposed commercial satellite launching facility. I regret the delay in my reply, which was caused by a change in project consultants and extensive additional studies. The draft environmental impact statement (DEIS) being prepared by the department will address all of the general concerns raised in your letter. However, in response to your specific comments:

Your concern about geologic hazards and potential pollution problems are specifically addressed in the DEIS. The types of jobs that would become available and the qualifications of local residents for these jobs are also discussed. All of the technical reports prepared for the DEIS, including a health and an ecological risk assessment, will be made available for public review.

We appreciate your constructive comments and hope that we have been able to address your concerns in a satisfactory manner. The DEIS will be made available for public review upon completion. If you have any further questions, please contact Mr. Ken Munechika or Mr. Richard Flagg of DBEDT's Office of Space Industry, at 586-2380.

Sincerely,

Takeshi Yoshihara

Enclosure

Page 3

the above has been - "That will be addressed in the Master Plan". Isn't that putting the cart before the horse?

These are just a few of the many unanswered questions. The families who live in this area have every right to answers.
And, the people planning and persuing this spaceport project have every obligation to provide honest, correct facts and answers.

L.I. Chesnar
Ka'u

Mrs. Lynne Chesnar
Star Route 32
Naalehu, Hi. 96772

(No telephone)

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NOV 27 1989
Office of Space Industry
DBED

11-159

NOV 14 1989

U.S. Department of Transportation
Office of the Secretary of Transportation

RECEIVED
NOV 27 1989
Office of Space Industry
DBED

400 Seventh St., S.W.
Washington, D.C. 20590

Ms. Lyynne Chesnar
Star Route 32
Naalehu, HI 96772

Dear Ms. Chesnar:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Ronald K. Gress
for Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED

NOV 27 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

89 NOV -6 AM 8:20

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

MY CONCERN IS AIR QUALITY EFFECTS.

FOR EXAMPLE, THE PAST TWO WEEKS IN HILO HAVE BEEN UNPLEASANT DUE TO A LACK OF TRADEWIND ACTIVITY, COMBINED WITH HEAVY VOG (VOLCANIC SMOG) ACTIVITY AND KONA IS OFTEN BESET BY VOG PROBLEMS. WHAT IMPACT WILL REGULAR LIFT-OFFS HAVE UPON AIR QUALITY, NOT ONLY IN LAUNCH VICINITY, BUT ON EAST & WEST SIDES OF THE ISLAND OF HAWAII? HOW WILL WIND PATTERNS AFFECT DISTRIBUTION LEVELS? ARE QUANTITATIVE ESTIMATES AVAILABLE FOR PUBLIC CONSIDERATION?

Name (Please Print) DR. RONALD D. GORDON

Mailing Address THE UNIV. OF HAWAII AT HILO

City, State, Zip HILO, HI, 96720-4091

Telephone 808 933-3479

11-160

NOV 14 1989

U.S. Department of Transportation
Office of the Secretary of Transportation

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NOV 27 1989

Office of Space Industry
DBED

400 Seventh St., S.W.
Washington, D.C. 20590

Dr. Ronald D. Gordon
The University of Hawaii at Hilo
Hilo, Hawaii 96720-4091

Dear Dr. Gordon:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Ronald K. Sloss

for Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

Received [illegible]

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 ☒ United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

SEE Enclosed information packet.

I feel that the suspended particulates from the Rocket Exhaust will have a very negative impact on our long term health + property values in West Hawaii; and also our tourism, farming + fishing industries.

☒ An important part of the E.I.S should be a complete search of evidence showing aluminum's relationship to brain deterioration + other negative health impacts.

Name (Please Print) Hank Kline

Mailing Address RT. 1 Bx 67R

City, State, Zip Capt. Cook Hi 96704

Telephone 808-328-9020

RECEIVED

NOV 27 1989

Office of Space Industry
DBED

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St. S.W.
Washington, D.C. 20590

Mr. Hank Kline
Rt. 1 Box 67R
Capt. Cook, HI 96702

Dear Mr. Kline:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED
NOV 9 1989
Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

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Aloha,

I am a resident of Kona & I work in the health profession.

My request is that no rockets be launched in Ka'u, Hawaii for health reasons.

#1. Air pollution - The volcano haze has already affected many people adversely - not only health wise, but our tourism industry needs lack of air pollution. The agriculture has also suffered with acid rain on our crops. Your study needs to look at specific weather patterns in Ka'u, as our area has an inversion layer similar to L.A.

#2 Danger of fuel storage - We frequently have earthquakes & volcanic eruptions. It is absurd to store & transport large amount of volatile fuels here. Statistics show this to be a high risk area for geolical tremors.

Thank you for listening to the people & preserving our natural beauty. Good luck in finding a more suitable location!

Name (Please Print) Allesa L. Langenstein

Mailing Address P.O. 1165

City, State, Zip Capt. Cook, Hi. 96704

Telephone 808-324-1681

11-162

U.S. Department of Transportation
Office of the Secretary of Transportation

RECEIVED
NOV 27 1989
Office of Space Industry
DBED

400 Seventh St. S.W.
Washington, D.C. 20590

Ms. Allesa L. Langenstein
P.O. Box 1165
Capt. Cook, HI 96704

Dear Ms. Langenstein:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED

NOV 9 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Aloha

I do not want the space port in Ka'u! If you do have the port, in Kona would have too much pollution. People can get very sick* we also have very much pollution from the volcanos. Plus people won't live very long! I AM CONCERNED!!!

11-163 to Back of page

Name (Please Print) Amy Lehua Langenstein

Mailing Address PO Box 1165

City, State, Zip capt. cook HI 96704

Telephone 323-3111 \ 324-1681

U.S. Department of Transportation
Office of the Secretary of Transportation

RECEIVED

NOV 27 1989

Office of Space Industry
DBED

400 Seventh St. S.W.
Washington D.C. 20590

Ms. Amy Lehua Langenstein
P.O. Box 1165
Capt. Cook, HI 96704

Dear Ms. Langenstein:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED

NOV 27 1989

Office of Space Industry
DBED

89 NOV 14 AM 9:35

WRITTEN STATEMENT FORM

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

Aloha,

As a resident of the Island of Hawaii for 15 years, I feel that the launch sites (both) in Kau Hawaii should be prohibited altogether for the following reasons:

(1) Environmental impacts to air quality which could result in worsening an already bad situation (especially for residents on water catchment)

(2) Geological instability of the sites - these areas have been prone to earthquake, flooding, tidal waves, high winds & lava flows.

(3) insufficient infrastructure - these areas are not serviced by good roads or in many cases county water to lessen the impact of pollution of rain water. In the event

(4) of an accident involving fuel or radioactive materials there are insufficient fire or medical services to serve the local population that may be impacted.

In closing, I would like to recommend studying Palmyra Island or some other non-inhabited site to shoot off rockets. Thank you

Name (Please Print) Thomas Langenstein

Mailing Address P.O. Box 1165

City, State, Zip Captain Cook, Hi. 96704

Telephone 808-324-1681

11-164

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St. S.W.
Washington D.C. 20590

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NOV 27 1989

Office of Space Industry
DBED

Mr. Thomas Langenstein
P.O. Box 1165
Capt. Cook, HI 96704

Dear Mr. Langenstein:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED
NOV 3 1989
Office of Space Industry
DBED

Maggie Mintz
c/o Gen. Delivery
Na'alehu
Hi. 96772
(808) 929-9971

Oct. 22nd 89.

Dear Mr. Mead.

I came to Hawaii six years ago from California, & two years ago I relocated from Capt. Cook to Na'alehu. I came to Hawaii for clean air, country living and a healthy atmosphere. I was somewhat disappointed by the constant eruptions of the Volcano & the resulting 'Vog' which has caused many people to either leave the island or as I have done, relocate to a part of the Island where there is slightly less vog. The strong winds tend to move the air whereas on the Kona side the 'vog' sits at the mountains edge & contaminates the air badly. Many people including my 5yr old daughter & myself suffer with lung problems. In Na'alehu the air is definitely cleaner.

LET'S KEEP IT THAT WAY.

The threat of a SPACEPORT is extremely serious to our fragile ecosystem. 'Vog', acid rain combined with TOXIC EMISSIONS from space launches seems to me a 'madness' many of us would not survive.

My first summer in Na'alehu we experienced a rather severe drought. The local parks turned off water supplies, all the grasses were dry & the risk of fire hazard high. In my small area along (MARK TWAIN ESTATES) I saw 3 fires in one day! one of them dangerously close to where I live.

I consider this beautiful [illegible] the tip of the U.S.A. - one of the last untouched spots in paradise. Contrary to some political propaganda there are many people out here in the Ka'u countryside. The schools are packed with small children. We are a very viable community who wish to see our families grow up in a healthy place. We do not wish a SPACEPORT, commercial or MILITARY on our doorstep. It is an insult to humanity to have to breathe toxic emissions from man made pollution. Our ever shrinking planet doesn't need another scar on it surface.

The so called safety zone for launching which indicates who should evacuate & who would be 'safe' when launches occur is merely an invisible line which means little to most of us. Toxic chemicals, as we know, have a nasty habit of crossing invisible lines. I personally would not feel safe living in a area near a SPACEPORT. As the 'vog' drifts into Kona so would toxic laden air. Already even tourists have noticed poor quality of the air & some I know choose not to come any more for health reasons.

We who live here love & respect our 'AINA' we we do not wish to be driven out by man's needless folly.

Please. We DO NOT WANT OR NEED A SPACEPORT HERE.

Sincerely Maggie Mintz

11-165

NOV 4 1989

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St., S.W.
Washington, D.C. 20590

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NOV 27 1989
Office of Space Industry
DBED

Ms. Maggie Mintz
C/O General Delivery
Naalehu, HI 96772

Dear Ms. Mintz:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Ronald K. Thiss
for Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

RECEIVED

NOV 2 7 1989

Office of Space Industry
DBED

WRITTEN STATEMENT FORM

89 NOV -2 PM 3:35

ENVIRONMENTAL IMPACT STATEMENT PROCESS

PROPOSED COMMERCIAL ROCKET LAUNCHING FACILITY, KA'U, HAWAII

Please hand this form in at the scoping meeting or mail it to either of the following addresses: Department of Business and Economic Development, Office of Space Industry, Attn. George Mead, PO Box 2359, Honolulu, Hawaii, 96804 or United States Department of Transportation, Office of Commercial Space Transportation, Attn. Randy Repcheck, 400 7th St. S.W., Washington D.C., 20590. If you choose to mail the form in it must be postmarked on or before November 17, 1989.

The potential environmental hazards of this project make it of dubious value to our island and/or State.
We need to set an example to other countries and states in our desire + ability to preserve and enhance the natural beauty and balance of our home. With tropical rainforests and delicate areas being destroyed world-over in the name of progress we cannot afford to tamper irreversibly with ours.
The question of aluminum in our air added to our already existing pollution problems is unacceptable to even consider.
We do not need this facility in our beautiful island.

Name (Please Print) JANICE PALMA

Mailing Address PO BOX 4849

City, State, Zip KAILUA KONA HI 96745

Telephone —

11-167

U.S. Department of Transportation
Office of the Secretary of Transportation

RECEIVED

NOV 2 7 1989

Office of Space Industry
DBED

NOV 1 4 1989

400 Seventh St., S.W.
Washington, D.C. 20590

Ms. Janice Palma
P.O. Box 4849
Kailua Kona, Hawaii 96745

Dear Ms. Palma:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Ronald K. Gress

for Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

Keawe Ehu Vredenburg
1013 Prospect St. #61
Honolulu, Hawaii
96822

Submitted by Keawe Vredenburg
25 October 1989

89 NOV 13 PM 4:44

Comments Submitted to:
ENVIRONMENTAL ASSESSMENT AND NOTICE PREPARATION FOR AN ENVIRONMENTAL IMPACT STATEMENT FOR A MASTER PLAN FOR THE DEVELOPMENT OF A COMMERCIAL ROCKET LAUNCHING FACILITY

Part I: Introduction

The Little study mentions only niche markets for rockets and then only on the strength of Hawai'i's location contributing to polar and equatorial orbit injections. The study did not recommend the use of sounding rockets, probably because the authors recognized the economic silliness of shipping tiny cheap scientific payloads 4000 miles West for launching, then dropping them into the ocean for pickup by a small boat launched from one of the state's roughest coasts. The risks are greatly magnified over driving out from White Sands to pick up the payload in a Jeep.

Part II: Description of the Proposed Action

LAUNCH VEHICLES

Since Japanese launch vehicles comprise half the selection of medium-lift ELVs, this reviewer expected to see considerable discussion on the impact of the immigration of Japanese national technicians into the Pahala community.

Sounding rockets are either entirely recoverable or their payloads must be recovered. There is no discussion in this section or others on the feasibility of launching (and landing) payload recovery watercraft at either Palima or Kalihipali. Many inexpensive scientific payloads are not built for landing in the ocean. A new requirement for flotation, as well as a locational transponder, would add to the expense of experiments currently being flown at "bargain" prices at White Sands.

There is no benefit to be gained by launching sounding rockets from Hawai'i since they do not attain orbital speeds, hence the advantage of equatorial rotational speed has no application.

The Pegasus air-launched rocket can offer several times the payload weight for the same price as a ground-launched rocket. The Pegasus can be launched from airports in the continental US in close proximity to satellite manufacturers. This study should address the likelihood of satellite users recognizing fiscal responsibility and choosing a less expensive, less risky and less remote launch site and launch vehicle.

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Office of Space Industry

Submitted by Keawe Vredenburg
25 October 1989

FACILITIES

The EIS should pay particular attention to the problem of storing toxic and explosive gases and liquids in an earthquake zone. The geologic history of the Ka'u area should be examined with respect to at least the last two hundred years. The Contractor must recognize that cataclysmic earthquakes have happened in this area in historic (ie. written historic "post-Cook") times.

EMPLOYMENT

Since Japanese rockets are being planned for launching, considerable attention must be given to the identification of social, political and cultural problems arising from the immigration of Japanese national technicians into the rural community. It is inconceivable that Japan will permit Americans to assemble, integrate and launch Japanese rockets with Japanese payloads. No responsible satellite or rocket program manager - US or Japanese - would allow non-employees, particularly foreigners, to step in at the critical point of launch. In an operation involving human life, effective, rapid communication is absolutely essential.

A Japanese rocket program manager who tries to launch Japanese rockets using technicians having only an imperfect understanding of the Japanese language is placing at risk both human life and project viability. In the past, American technicians in Japan mated American rockets and American satellites that had been purchased by Japan. The future will be the opposite case, with Japanese doing the technical work.

Therefore, the Ka'u community (and, eventually, DBED) should be alerted to the likelihood that if Japan provides most of the business, Japanese workers will also have most of the skilled technical jobs.

The estimates of skill requirements must take note of this and specify the number and types of jobs that will be filled by foreign personnel when foreign rockets and payloads are being launched. Further, memoranda of understanding or agreement between the Ka'u community and DBED become useless when a foreign country is involved since DBED has no authority to negotiate foreign national treaties.

Submitted by Keawe Vredenburg
25 October 1989

PART III: Description of the Environmental Setting

GEOLOGY AND TOPOGRAPHY

Although lava flows are certainly a risk in this area, the major risk, recognized by local residents, is from earthquakes and tsunami. The EIS must pay more attention to earthquake risk than this Notice Preparation has.

CLIMATE

Wind direction during the day generally is in the direction of Pahala and Na'alehu. Any emissions will necessarily impact those communities.

WATER AND FLOODING

Nothing was said about salt water spray. An observer will notice that even on a calm day, breaking waves exceed cliff height at many locations on this coast. Salt spray, and its effects on microcircuits, radar and radio antennae, and rocket motor controls, must be considered as a priority item.

As for flooding being minimized by the "highly porous lava substrate", see Pukui's book on place names.

PART IV: Some Potential Environmental Impacts and Mitigating Measures

AIR QUALITY

Standards, particularly those that are non-existent in Hawai'i, should be re-examined to ensure that what is considered excellent air in Los Angeles does not become a standard for Hawai'i.

MARINE ENVIRONMENT

Because of the "highly porous lava substrate" mentioned earlier, some considerable analysis should be done on the likelihood of fuel spills polluting the inshore sea life, such as limu, 'opihi and others. Merely washing fuel away with water does not eliminate the problem. Please note the effect of the current lava flow on limu and crabs several miles South of the activity site. Ka'u residents have already noted water purity problems associated with sugar cane fertilizers - rocket fuel is worse.

Submitted by Keawe Vredenburg
25 October 1989

SOCIAL IMPACTS

There is now a clear requirement for a study of the impact on Ka'u of importing skilled technical workers from Japan. When Americans went to Japan in 1975 to develop their satellite support facility and software systems, they met with some resistance and lack of cordiality. DBED would be remiss if they continue to think that Hawaiians are likely to be complacent when all the terrific technical jobs promised in 1989 are filled by foreigners and mainland Americans in 1992.

Language - Since native Hawaiians comprise a large segment of the local population, it is recommended that a Hawaiian language editor review all future documents to correct the many misspelled words, including the use of the apostrophe (') in place of the 'okina (').

Income Levels - The impact of a high-paid, professional subsociety on the current medium to low income local population should be assessed. A social history of Waikiki might be examined for evidence of what happens when an affluent society requiring specialized personal services and luxury food and clothing items is superimposed on an agrarian economy.

Local Priorities - It should be noted that all discussions of the proposed spaceport assume the local population has the same drives and priorities as the population of the United States and Honolulu. The assumption that all of Hawai'i desperately wants it's land developed is not correct. This drive to convert land into buildings is not consistent with the preferred Hawaiian way of life. Some credence must be given to the fact that humans exist who do not share the Western European ideal of perpetual development with its accompanying tenet that there is a preeminence in beauty of a housing tract over natural land. There were a lot of natural things colored green before the dollar was invented.

It is therefore recommended that the EIS Contractor obtain the essence of a philosophical background in Hawaiian values, rather than continue to proceed under the assumption that Ka'u is just Portland or Pittsburg moved a few miles farther West, and deserves to look like 'Iwilei as soon as possible. Pittsburg and Honolulu are not the desired models for Ka'u.

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St. S.W.
Washington, D.C. 20590

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NOV 27 1989
Office of Space Industry
DBED

Mr. Keawe Vrendenburg
1013 Prospect St. #616
Honolulu, HI 96822

Dear Mr. Vrendenburg:

We are in receipt of your written comments concerning issues to be addressed in the Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

Your concerns will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS, at which time you will be invited to make comments before the EIS is finalized.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

IV +

RECEIVED

NOV 27 1989

Office of Space Industry
DBED

Post Office Box 158
Naalehu, Hawaii
October 25, 1989

89 OCT 31 AM 10: 13

To whom it may concern:

As a resident of Kamaoa Road in Waiohino on the "Big Island" of Hawaii, I am concerned about the proposed Space Port site E.I.S. which does not address safety zones for fuels, payload processing areas and industrial areas. The explosive and poisonous nature of chemicals in E.L.V.s would become a dangerous situation.

I would, thus, want to be a consultant party to the State's E.I.S. procedures.

I am also asking for a thirty day extension to the Environmental Assessment and Notice preparation because of the sloppy and false statements presented in the Federal document.

Your early response to this request would be deeply appreciated.

Very truly yours,

Douglas K. Walsh

Douglas K. Walsh

11-171

NOV 14 1989

U.S. Department of Transportation
Office of the Secretary of Transportation

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NOV 27 1989

Office of Space Industry
DBED

400 Seventh St., S.W.
Washington, D.C. 20590

Mr. Douglas K. Walsh
P.O. Box 158
Naalehu, Hawaii 96772

Dear Mr. Walsh:

Thank you for your recent letter regarding the preparation of an Environmental Impact Statement (EIS) for the proposed commercial rocket launching facility on the Island of Hawaii.

As requested, you will be included as a consulted party in the EIS process. Accordingly, the concerns expressed in your letter will be taken under advisement during the development of the EIS. In addition, you will be sent a copy of the Draft EIS at which time you will be invited to make comments before the EIS is finalized.

The Environmental Assessment and Notice of Preparation mentioned in your letter are documents prepared by the State of Hawaii. Your comments regarding these documents have been forwarded to the Department of Business and Economic Development in Honolulu.

Thank you for your interest in the proposed launch facility project.

Sincerely,

Ronald K. Hicks

for Norman C. Bowles
Associate Director for
Licensing Programs
Office of Commercial
Space Transportation

cc:
George Mead, DBED

SECTION I: AGENCIES, ORGANIZATIONS AND INDIVIDUALS WHO COMMENTED ON THE DRAFT EIS

The following agencies, organizations and individuals submitted written comments on the draft Environmental Impact Statement which was published in August, 1993. An asterisk (*) denotes letters with no substantive comments; a double asterisk (**) denotes letters from people who used aliases and/or who did not include a return address with their comments. Copies of all letters addressed to the Governor, DBED and/or OEQC during the 90-day public review period - and responses to the comments - are included in Section II of this Chapter.

A. UNITED STATES CONGRESS

House of Representatives

The Honorable Patsy T. Mink

B. FEDERAL AGENCIES

Department of Agriculture

Soil Conservation Service

Department of the Army

U.S. Army Engineer District, Honolulu

Department of the Interior

Geological Survey, Hawaiian Volcano Observatory
Geological Survey, Water Resources Division*
National Park Service

C. HAWAII STATE LEGISLATURE

The Senate

The Honorable Andrew Levin

D. STATE AGENCIES

Department of Defense

Department of Accounting and General Services *

Department of Budget and Finance
*Housing Finance Development Corporation**

Department of Health

Department of Land and Natural Resources

Department of Transportation

Office of Hawaiian Affairs

*Office of Environmental Quality Control**

University of Hawaii at Hilo
Center for the Study of Active Volcanoes

University of Hawaii at Manoa
Institute for Astronomy
Department of Physics and Astronomy

E. HAWAII COUNTY COUNCIL/CLERK

The Honorable Keiko Bonk-Abramson, Councilmember

The Honorable James M. Rath, Councilmember

Robin J. Yahiku, County Clerk

F. HAWAII COUNTY AGENCIES

Civil Defense Agency

*Department of Water Supply**

Planning Department

G. ORGANIZATIONS

Hawaii Green Party

Hawaii Island Economic Development Board

Hawaii Island Space Exploration Office

IASCO

Informational Network for the Spaceport

Ka Lahui Hawaii

Ka Ohana O KaLae

Kona Hawaiian Civic Club

The Pele Defense Fund

H. INDIVIDUALS

Ruth Marie Bass
D. Hunter Beyer
Margaret B. Callan
Eleanor Cate
Patrick Christiano
Concerned Conservative**
Jesse Aina Dawn
Victoria Dawson
Eleanor Duyndam
Jean T. Ednie
John Elhard
Kathleen Elhard
Benjamin Gomes
Dennis Gottschalk
William F. Hachmeister
Basil W. Hansen
Jay Hanson
Meghan M. Harper
Janie I. Henderson

Janet Hotchkiss
Ann Hulyk
Phillip Jenkins
Genie Joseph
William J. King, MPH
Alice R. Klein
Valerie Kos
Thomas Langenstein
Tammie Lee
Cynthia G. Lewis
Chris Marble
Mara Marin
Gerdine Martin
Scott and Margaret Martin
J. Moore
Jon Myers
Carole L. Nervig
Nathan Nishiki
George Pace
Julie Stoner Pasquale
Linda Holmes Peebles
Pamela Arden Philip
E. D. Quimby
Allison Ray
Registered Voter**
Glenn Robinette
Don Rogers
Ted A. Rosas
John Schinnerer
Malie Sellers
Linda L. Shackelford
C. Gregory Shropshire
Anna Sierpinske
Lanny Sinkin
Carrie Smith
Mary Lou Sumida
Warren K. Sumner
Sharon L. Sumner
Patricia Tummons
Jeffrey L. Turner
J. Curtis Tyler, III
Theresa Villa
Mark Wakata
Douglas Walsh
Dorothy Wood

SECTION II: WRITTEN COMMENTS ON THE DRAFT EIS AND DBEDT RESPONSES

Copies of all comment letters received during the 90-day public review period of the draft EIS - together with responses from DBEDT - are included in the following pages. Letters expressing "no comment" did not require a response. Letters from people using aliases and/or those who did not include a return address with their comments are responded to and published in this section, however, they could not be mailed to the writer. Please refer to Appendix E for a written transcript of a video entitled "Spaceport-Benefit or Tragedy" that was submitted by William Frederick Hachmeister during the public review period.

Subsequent to the printing of the FEIS, OEQC provided DBEDT with 13 additional comment letters that were received during the public review period. These letters are from the following individuals:

Meghan D. Connors
Richard J. Fairchild
Clemente C. Hudson
Michael Johnson
Jack Lee
Diana Marriott
Anne K. Moikeha
Terry Pinney
Florita Pyodum
Resident (signature not legible)
Elizabeth Spooner
Christine Whitney
A. Winterbottom

Copies of their comments and DBEDT's responses to them have been added to the end of this Chapter.

PATSY T. MINK
SECOND DISTRICT, HAWAII

WASHINGTON OFFICE:
213B RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-1102
(202) 225-4906
FAX (202) 225-4987

DISTRICT OFFICE:
S104 PRINCE KUHIO FEDERAL BUILDING
P.O. BOX 50124
HONOLULU, HI 96850-4977
(808) 541-1986
FAX (808) 538-0233

Congress of the United States
House of Representatives
Washington, DC 20515-1102

COMMITTEE ON STEERING AND POLICY
COMMITTEE ON BUDGET
COMMITTEE ON EDUCATION AND LABOR
SUBCOMMITTEES:
ELEMENTARY, SECONDARY & VOCATIONAL EDUCATION
POSTSECONDARY EDUCATION
LABOR MANAGEMENT RELATIONS
COMMITTEE ON NATURAL RESOURCES
COMMITTEE ON GOVERNMENT OPERATIONS
(on leave)

November 21, 1993

The Honorable John D. Waihee
Governor of Hawaii
C/O Office of Environmental
Quality Control
220 South King Street, Ste 400
Honolulu, HI 96813

Dear Governor Waihee:

I am writing to express my strong opposition to the proposed commercial satellite launching facility at Palima Point in Kau, Hawaii and to register my disagreement with the conclusions of the Draft Environmental Impact Statement (DEIS) that the benefits of the project outweigh the potential adverse impacts to human health and ecological systems.

The primary benefit cited in the DEIS is the increase of jobs in the Kau area and the potential for high technology positions for Hawaii residents. However, these employment forecasts, with the exception of the construction jobs, are predicated on the notion that the world-wide satellite market will support another launch facility. And that Hawaii's launch facility is economically viable and will be able to sustain itself.

The DEIS analysis is based on projections of 10-15 launches in 1998 increasing to a rate of 15-22 in the year 2000. However, according to a report issued last year by the Vice President's Space Policy Advisory Board between 8 and 10 commercial launches annually are expected in the U.S. over the next 20 years.

Furthermore, the DEIS does not include information on the market analysis used to support the basic premise that the spaceport is economically viable and will therefore sustain 270 new jobs directly related to the spaceport.

Yet, even the DEIS points out the numerous potential adverse impacts of the proposed spaceport to the health and safety of the Kau residents and the environment, including:

NATURAL HAZARDS -- The proposed site is located in an area at high risk of lava flow, earthquakes and tsumanis, any of which could damage the facilities and breech containment of rocket propellants stored on site, causing the release of toxic gases and thereby jeopardize the health and safety of workers and nearby residents.

PRINTED ON RECYCLED PAPER

The proposed site is within Lava Flow Hazard Zone 1, the most hazardous zone. The DEIS acknowledges that only temporary lava diversion techniques could be used to prevent damage of facilities, but that "if the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."

SAFETY HAZARDS OF TRANSPORTING FUEL -- The location of the proposed space port will require the transportation of solid and liquid propellant from Hilo Harbor to Palima Point over a rural highway that was not built to sustain a significant amount of traffic containing hazardous materials. Should an accident occur, impact on human and environmental health could be significant. Nearby residents and individuals traveling on Highway 11 could be exposed to toxic gases. Long-term impacts of such exposure include increased cancer risks.

In addition the EIS does not address whether current emergency response capability in the Hilo and Kau area are adequate to mitigate the impact of an accident while transporting rocket fuel.

LAUNCH FAILURE -- Although a safety zone of 2.9 miles behind each pad would be designated, a launch failure could have short-term and long-term impacts outside the safety zone, including the release of toxic gases, explosions, falling debris, noise and vibration. Volatile gases and material would cause serious harm to surrounding residents. During certain weather conditions, toxic clouds could travel to other parts of the island endangering health in those areas.

IMPACT ON HAWAII VOLCANOES NATIONAL PARK -- The proximity to the Hawaii Volcanoes National Park will no doubt cause adverse impact on the park and the ability of visitors to enjoy the tranquil setting of the park. Increased human activity, increased noise levels, roads, vista contamination from rocket towers and artificial lights, increased road and air traffic across the park and restrictions on access to the park will all contribute to the degradation of the biological and aesthetic features of the park.

Launch failure and the danger of falling debris would pose the greatest risk to visitors, plant and animal life within the park.

The Honorable John D. Waihee
November 21, 1993
Page Three

RISKS TO ENDANGERED SPECIES -- The launch site is located near the nesting area of the green sea turtle and the endangered hawksbill turtle. The endangered Hawaiian Hory Bat, and the Hawaiian Hawk have been seen near the launch area. In addition humpback whales are known to swim in the ocean near the proposed spaceport during its annual migration. The impact of noise, construction, degradation of habitat, exposure to toxic fumes, and debris from an aborted launch could endanger the existence of these species.

In addition to the aforementioned concerns, the spaceport could contribute to the degradation of archeological and cultural sites, increase noise pollution (which has already been a major concern of this particular community), contaminate groundwater, restrict recreational use of the land and ocean, and disrupt the tranquil and rural lifestyle of the residents.

The community has expressed strong opposition to the spaceport, even though they presumably would be the beneficiaries of the job opportunities. The resident survey in Volume IX appendix C of the DEIS shows that 65 percent of the residents of Kau are opposed to a spaceport.

For these reasons, I believe that the proposed spaceport is not in the best interest of the residents of Kau and the State of Hawaii.

Thank you for the opportunity to comment.

Very truly yours,

Patsy T. Mink

PATSY T. MINK
Member of Congress

12-7

JOHN WA
GOVE
JEANNE K. SCH
DIRE
RICK EG
DEPUTY DIRE
TAKESHI YOSHIH
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

The Honorable Patsy Mink
Representative
U.S. House of Representatives
2125 Rayburn House Office Bldg.
Washington, D.C. 20515-1102

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Congresswoman Mink:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *Strong opposition to the proposed commercial satellite launching facility at Palima Point and disagrees with the conclusions of the draft EIS that the benefits of the project outweigh the potential adverse impacts to human health and ecological systems.*

Response: We acknowledge your opposition to the proposed project, however, we disagree with your statement that the dEIS concludes that the "benefits of the project outweigh the potential adverse impacts to human health and ecological systems." The dEIS discloses facts and study results and proposes mitigating measures, it avoids conclusions as to the acceptability or non-acceptability of the impacts disclosed or the efficacy of the mitigating measures presented. The EIS is intended to provide factual data to be used as the basis for making informed decisions. This is in accordance with the definition promulgated in the Environmental Impact Statement Rules, (Title 11, Chapter 200, Sect. 11-200-2) which states that:

> *"...an EIS means an informational document prepared in compliance with chapter 343, Hawaii Revised Statutes and this chapter and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic and social welfare of the community and state, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects and alternatives to the action and their environmental effects."*

In compliance with chapter 343 Hawaii Revised Statutes and the Environmental Impact Statement rules, the dEIS attempts to disclose all significant impacts (both positive and negative)--generated as a result of certain activities and accidents related to the proposed project--in a non-judgmental manner. The objective is to provide as complete information as possible to the agencies and legislative bodies that will make the final decisions as to whether or not support of the project should be continued. There are also a number of unresolved issues listed on page S-15 that, upon assessment, could play a significant role in determining whether the spaceport benefits outweigh the impacts.

Comment: *What is the basis for jobs, market, and economic forecasts?*

Response: The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. A copy of the assumptions used for financial forecasts is attached. Estimates of the number of employees at the spaceport are based upon the job functions which must be performed to provide common services, maintain the infrastructure, operate and maintain the range safety system, as well as process and launch rockets and their payloads. It is assumed that the spaceport would be used on a continuing basis and that essential jobs would be permanently filled.

Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the planned number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: *Natural hazards are a high risk at Palima Point.*

Response: The purpose of the dEIS is to disclose the potential adverse and beneficial impacts of the proposed spaceport to humans and the environment. The geological hazards at Palima Point and the potential risks of developing a facility at that location are fully disclosed in Volumes I and III of the dEIS. Because of the substantial private capital required to build and operate the facility, in addition to satellites potentially worth hundreds of millions of dollars, earthquake and lava flow hazard information would receive serious consideration before investment decisions are made.

Comment: *Safety Hazards of Transporting Fuel. Long-term impacts of exposure to toxic gases from transportation accidents include increased cancer risks. In addition, the dEIS does not address whether current emergency response capability in the Hilo and Ka`u area are adequate for spaceport operations.*

Response: The safety hazards of transporting fuel to the site, as well as possible mitigating measures are discussed in Volumes I, Volume VI and VIII of the dEIS.
Although the consequences of one spill that is not remediated immediately could be significant, the risk of such an accident occurring is minimal for the following reasons:

- Transportation of liquid propellant chemicals is regulated by the U.S. Department of Transportation and hazardous drums and cylinders must conform to DOT specifications. 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to puncture because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials. As stated in the dEIS (Appendix VIA), *"...the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."*

- Accident rates along the transportation route were based on accident statistics for each road segment evaluated for all vehicle types, which is likely to be an overestimate of the truck accident rate. *"Historically trucks carrying hazardous materials have a lower accident rate than that for other vehicles (DEIS Volume I, page 5-39)."*

- The trucks or vans carrying toxic fuel will be accompanied by a HAZMAT team. As stated by Risk Science Associates (Appendix VIIIA), *"It is assumed that within this 15-minute blanketing time, the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it."*

The current emergency response capability in Hilo and Ka`u is not adequate for transporting hazardous materials to the spaceport. This will be provided by the spaceport operator, no expenditures of public money would be required to pay hazardous materials personnel. In addition, training will be offered to Hawaii County civil defense, fire and police personnel so that they can enhance their emergency response skills. These skills will be valuable for other emergency situations on the island of Hawaii as well as being a backup for Spaceport HAZMAT personnel.

Comment: *Launch failures could cause serious harm to Hawaii residents.*

Response: Your comments accurately re-state the potential hazards associated with various launch failures enumerated in the dEIS, but fail to account for range safety mechanisms. It is important to recognize that strict launch requirements similar to those employed at existing ranges to protect people and the environment would be used at a Hawaii range. Prior to any development, extensive wind monitoring would take place to determine which times present acceptable conditions for launch. Please refer to Volume I, Chapter Two, Section II, for a discussion of range safety.

Comment: *The spaceport will cause adverse impacts to the tranquil setting and cause degradation of Hawaii Volcanoes National Park.*

Response: As stated in Volume II, page 7-29, it is true that *"...rocket launches will occasionally disrupt the wilderness character of the back country portions of the Park."* It is pointed out, however, that the facility includes a large undeveloped area adjacent to the Park that will remain in its wilderness state as open space. On page 7-26, the dEIS states, *"...it is unlikely that these lands will remain undeveloped indefinitely without a spaceport."* Range safety procedures and mitigation measures would prevent launch hazards from endangering park visitors.

Comment: *Increased road and air traffic and restrictions on access to the park will contribute to degradation of biological and aesthetic features of the Park.*

Response: Increased road and air traffic are not expected to create significant impacts to the Park. As noted in Volume II, page 7-34, noise from ongoing operations is expected to be inaudible with stock mitigation features implemented.

> *"The additional traffic generated by the launch facility should cause less than a 1.5 dB increase...such an increase is not considered significant."*

The dEIS also recommends

> *"To minimize helicopter noise in the Park it is recommended that ingress and egress routes over the ocean and all routine sweeps be greater than one mile from the Park boundary and preferably at lower altitudes."*

Under favorable climatic conditions,

> *"...the sounds of a rocket launch will be similar to the rumble of distant thunder" from the HVNP Visitor Center.*

On the subject of park access, rather than further restrict access to the park, the facility could result in greater visitor access. Page 7-29 of Volume II of the dEIS states,

> *"The facility could...indirectly encourage greater recreational use of the shoreline, which is currently remote and seldom used by Park visitors."*

Experience at other National Parks has demonstrated that it is increased human traffic that contributes most significantly to the degradation of biological and aesthetic features of the Parks. During the several trips made by consultants to the Kamehame Hill area during field work (from 1990 to 1993), there was considerable evidence of camping on the beach in the form of tent pole structures, rubbish, and fire pits (a source of light detrimental to endangered turtles, as well as flashlights as evidenced by numerous expended dry cell batteries in the area.) With a management program in place that controls access, sensitive habitats (such as turtle nesting areas) and environmental resources (such as archaeological sites) can be better protected; protection without such a program may not be possible.

Launch failures would not pose the greatest risk to the Park and visitors. As noted on page 7-35,

> *"In theory, debris from an elevated explosion of a rocket could land within Park boundaries, in practice, operational constraints would not permit a launch under conditions where debris could land on Park lands or other areas outside the (Population Control Zone) PCZ."*

Some of the debris patterns shown in the dEIS indicate that debris may land on the shore and further inland. These patterns were prepared for different sets of wind conditions intended to describe the variety of non-storm meteorological conditions expected at the spaceport. If, at the time of launch, a debris pattern is expected to

fall on land and violate an Impact Limit Line (i.e. there is an indication that the debris will present a risk to any person or asset on land) this becomes a reason for stopping the launch until the wind conditions change and the debris pattern doesn't violate an Impact Limit Line. This is done at Vandenberg Air Force Base and, in addition, it is a standard practice at VAFB to compute the potential risk prior to launch using the current wind (and wind uncertainties). If the risks ("casualty expectations") are higher than what are considered acceptable, the launch is held until the winds change and the risks have dropped to an acceptable level. This same procedure would be used at a Hawaii spaceport. We would propose that the levels be consistent with those used at the U.S. National Ranges, where operations have resulted in no injuries or fatalities over a forty year period.

Comment: *Risks to Endangered Species. The spaceport could endanger the existence of rare species.*

Response: The risks to endangered species stated in your letter are summarized in Chapters Four and Five of Volume I of the dEIS, and discussed in more detail in Volume VIII. No development, however, would take place in sensitive habitats, nor would launch debris be allowed to fall outside the PCZ. None of the debris footprints calculated for the dEIS indicated an effect on the Kamehame Hill area. If an actual project emerges in the future, debris calculations would be performed in a supplemental EIS for the specific rocket planned to be launched. If those debris patterns show that the Kamehame Hill and beach area could be affected, mitigating measures must be developed in cooperation with the Fish and Wildlife Service and the National Marine Fisheries Service to protect the endangered turtles and their habitat.

Comment: *The spaceport would adversely impact archaeological sites, increase noise, contaminate ground water, restrict recreational use, and disrupt the tranquil life-style.*

Response: As discussed in Chapter Seven of Volume II, archaeological and cultural sites within the project area would be preserved or recovered according to a preservation plan that meets requirements of Chapter 6E, Hawaii Revised Statutes. The preservation plan would be developed in consultation and coordination with the Historic Preservation Division of the Department of Land and Natural Resources. An Archaeological Preserve would be created to ensure the preservation of significant resources for future research and public appreciation.

A spaceport development would be associated with an increase in noise, particularly during construction and launches. It should be mentioned, however, that both of these activities are temporary, and that launches would be infrequent and of short duration. Ground water contamination, as discussed in the dEIS, is an unresolved issue. Analyses of the effects of spills on ground water wells at various locations along the transportation route would be undertaken before any toxic liquid propellants are transported to the site.

Recreational use of the project shoreline area may actually increase with a spaceport development. Currently, site access from Highway 11 is restricted by locked gates. Except for the fenced-off facilities, the shoreline areas of the PCZ would remain open to the public during daylight hours unless there is a launch or other hazardous operation. Improved access to the shoreline would diminish the current privacy and seclusion for fishing, gathering, hiking, and camping, and subject sensitive archaeological and biological areas to increased human intrusion. Implementation of the Shoreline Access Management Plan in Appendix XF would mitigate some of these concerns.

Comment: *The community has expressed strong opposition to the spaceport.*

Response: As stated in Volume II, Chapter Seven and in Appendix IXC, a resident survey indicated a strong preference for continuing existing life-styles. The qualities of Ka'u that respondents felt should be preserved included its life-style, open space and shoreline, historic and archaeological sites, and fishing and gathering grounds. These qualities must be carefully considered during all stages of the project, if developed. Although a spaceport would predispose Ka`u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the PCZ, the project area would be mostly open space.

attachment

Please refer to Appendix D of the FEIS for the September 1993 report by the DBEDT Office of Space Industry entitled "Financial Feasibility Studies Related to the Proposed Hawaii Spaceport" which was attached to this response.

United States Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, HI
96850-0001

November 19, 1993

Mr. Tak Yoshihara, Deputy Director
Department of Business, Econ. Dev. & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Yoshihara:

Subject: Draft Environmental Impact Statement - Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point

We have completed our review of the Draft Environmental Impact Statement and would like to offer comments concerning potential adverse impacts to the natural resources of the Ka'u Region. The impact statement has amassed a wealth of resource information about Ka'u. However, the statement lacks the indepth analysis of potential adverse environmental impacts caused by fuel spills due to transportation and onsite operational accidents.

The Impact Statement does not adequately assess the potential adverse impact of a rocket fuel spill upon the fresh water aquifer. Fresh water is a significant resource which must be addressed. Preventive or mitigation measures are not adequately addressed in the EIS. In addition, potential adverse pollution of the nearshore and coastal area environment is not adequately addressed by the environmental impact statement.

Since its establishment, Ka'u Agronomics has historically discharged mill wastewater creating wetland areas below Pahala. Recurring floodwaters of Paauau and Hionamoa watersheds have extended this process into Kananelu Flats and beyond to low lying areas near the coastal areas near Palima Point. During periods of heavy rainfall, the low lying areas within the project area of influence function as wetlands. There is no assessment or evaluation of this important natural resource with the document.

We sincerely hope that these natural resource concerns are addressed in succeeding process of public review and documentation. We appreciate the opportunity to provide comment. Should you have any questions, please contact Michael C. Tulang at (808) 541-2606.

Sincerely,

NATHANIEL R. CONNER
State Conservationist

cc: Lindsey Carter, District Conservationist, Hawaii Field Office

"To lead the way in helping our customers conserve, sustain, and enhance Hawaii's natural

12-11

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
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SEP. 30 1994

Mr. Nathaniel Conner
State Conservationist
United States Dept of Agriculture
Soil Conservation Service
P.O. Box 50004
Honolulu, HI 96850-0001

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Conner:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services, Risk Science Associates, Char & Associates, Leonard A. Freed and Richard E. Brock, Ph.D. contributed to the preparation of the following responses.

Comment: *The dEIS lacks in-depth analysis of potential adverse environmental impacts caused by fuel spills due to transportation and on-site operational accidents. It does not adequately address adverse impacts or a rocket fuel on the underground aquifer or nearshore areas and coastal environment.*

Response: Potential contamination of groundwater is addressed in the dEIS. A special report was prepared by Harding Lawson Associates and is included in Appendix IIIB of the dEIS. Potential contamination of groundwater due to a fuel spill at the launch pad will not affect known upgradient municipal wells. Contamination of downgradient groundwater can occur during a spill in which rocket fuel is released to the ground without secondary containment. In order to prevent soil contamination resulting from accidental propellant spills at the propellant storage areas of the proposed facility, however, mitigation measures including containment systems will be implemented. The following description of the mitigation measures to be taken is found on page 5-135 of Volume I of the dEIS. There it is stated that:

> *"State and Federal regulations require that propellant storage areas incorporate proper containment. Design of the propellant storage, payload processing and launch areas must include containment. Liquid fuel storage tanks will be surrounded by dikes, barricades, berms or other suitable protective mounds. Reservoirs will have a capacity 10 percent greater than the propellant storage tanks. These measures will limit the surface area of a spill and prevent the contents of tanks from mixing with incompatible material that could result in fire, explosion or toxic conditions. The containment areas will have impervious linings to protect groundwater from contamination."*

According to the groundwater resources investigation prepared by Harding Lawson Associates and contained in Appendix IIIB of the dEIS, the largest accumulated amounts of liquid fuels in single vessels without secondary containment will be at the launch pads. The fuel spill scenarios evaluated in the HLA investigation are assumed to occur at the central launch pad which is about 1,500 feet inland from the ocean shore.

In the HLA investigation, two types of fuels are assumed to spill in a sudden accident from fully fueled rockets and infiltrate the subsurface in a limited area near the launch pad: 615 gallons of Aerozine-50, a liquid fuel used in Delta rockets that is a mixture of hydrazine and UDMH and miscible with water, and 15,676 gallons of kerosene (RP-1), a liquid fuel used in Atlas rockets that is immiscible with water.

HLA states the following in the groundwater resources investigation (page 16):

> *"Conceptually, fuels released over the ground surface are expected to infiltrate, percolate downward through the unsaturated zone to the groundwater surface, and then migrate horizontally with the groundwater either as a solute (in the case of miscible liquids) or a floating separate-phase liquid. Groundwater in the area of the proposed spaceport generally flows seaward and discharges from the subsurface at the shore of the ocean as dispersed fresh or brackish springs."*

HLA identifies the existing drinking water wells in the report which are located inland from the proposed facility near the town of Pahala and along the highway to the south of the site (see the well inventory in Table 1 and the groundwater hydrology map in Plate 3 of the HLA report). Thus, spills at the launch pad would not affect these drinking water wells as the spills would be downgradient from the existing wells. In any event, dosages, cancer risks, and noncancer hazard indices for ingestion of contaminated groundwater are quantified in attachment A of this letter. These spills analyses are conservative overestimates, however, because the mitigating effect of the concrete launch pad is not included. In other words, this analysis does not assume any containment, barrier, or other obstacle to the downward migration of the spilled material.

The concerns expressed about effects on nearshore areas and the coastal environment assume that any spilled materials would be toxic to nearshore and coastal marine biota. This is not necessarily so, however, because toxicity is a function of concentration; as soon as any material reaches the groundwater, concentration begins to decline. The large groundwater input along much of the shoreline in the vicinity of the launch pads would transport spilled materials quickly to the sea. Once in the ocean, the mixing processes are enhanced.

The ocean fronting Palima Point is very rough and exposed to the northeast trades. Any pollutant reaching the ocean via groundwater discharge would be very rapidly diluted just because of the rough nature of the ocean in the area. Additionally, one should note that water depth increases rapidly along the coast from the shore. The "shelf" on which one finds hermatypic corals (the usual corals of coral reefs which are normally restricted to water less than 200 feet deep) is within 100 yards of shore along much of the area; in other words, normal coral reef communities are restricted to a very narrow band along most of this coast and open ocean conditions exist right up to the shore.

With surface or shoreline input, the benthic (bottom) communities would probably have little opportunity for exposure to pollutants coming into the system at the surface or carried in by groundwater. Preliminary analysis suggests that even if (1) a spill were to occur and (2) the spill material were not contained, toxic impacts would be minimal due to the apparent large flow of groundwater in the area, and the high energy nature of the ocean fronting the project site.

Since there are no available eco-toxicological data on the potential effects of exposure of most aquatic species to the kinds of contaminants under consideration here,

routine monitoring of the air, groundwater and nearshore water for these contaminants should be part of the overall management program for the launch facility.

Comment: *The dEIS should assess and evaluate the wetland areas of Kanenelu Flats and other wetland areas near Palima Point.*

Response: As part of the survey for anchialine pool resources (Appendix IIIE), the low lying coastal area around Pu`u Pili and Palima Point (particularly the "pickleweed" areas) were closely examined to determine if there were any ponds or standing water. No standing water in this area was observed during any of the trips made to this area. At some time in the past, however, there must have been a number of wells or low points where fresh ground water could be accessed because there are numerous Hawaiian house sites and other structures in the area suggesting some reasonable level of occupation and an obvious need for freshwater.

The aquatic survey report also notes that several areas along the coast appear to be intermittent streambeds. For example, there was one area where recent rains and runoff had left dry grass and branches stuck in trees as much as 2.5 meters above the ground. The distribution of these materials up in trees, the presence of freshly moved boulders as well as small trees and grass in a prostrate position indicated the path of the water; at the shoreline this particular swale was estimated to be about 100 m wide.

The findings above suggest that, with sufficient rainfall, considerable freshwater may be carried down to the coast; several of these swales were examined for water with no success. It is probable that rather than wetlands (with freshwater aquatic biota), there are a number of intermittent streambeds that cross the project site. In the lower reaches these intermittent streambeds are wide swales that empty into the sea. If freshwater is retained in the lower reaches of these swales, the possibility exists that a "wetland" will form, but the probable transitory nature of the water suggests that it would have little value to aquatic biota.

The vegetation found on the low-lying areas which receive mill wastewater and flood waters are also described in the botanical studies report, Appendix IIIC (pages 4 through 5), under the Guinea grass-California grass Community section. The bird and mammal survey, published in full in Appendix IIID, specifically addresses the possible use of the project area by the Hawaiian Duck, the Hawaiian Stilt, and the American Coot, all wetland birds.

If an actual project is approved, a wetlands delineation survey would be conducted for the westernmost launch pad site because a portion of it lies within the Guinea grass-California grass community. Wetlands must meet all three criteria identified by the Army Corps of Engineers (COE). These criteria are: hydrophytic vegetation, i.e., wetland indicator species must compose more than 50 percent of the plant cover; hydric (anaerobic) soils; and hydrology, i.e., water must be on or near the surface at least 14 days of the year. Some portions of the Guinea grass-California grass community may meet these criteria. A COE permit is required for construction in a wetland area.

Attachment

Attachment A

POTENTIAL ADVERSE EFFECTS OF FUEL SPILLS ON GROUNDWATER RESOURCES ALONG THE TRANSPORTATION ROUTE AND AT PALIMA POINT

By

Risk Science Associates
August, 1994

ON-SITE SPILLS

Background and Overview. The potential for contamination of ground water is related to the location of the wells being used. Groundwater from the known upgradient municipal wells would not be affected by any potential contamination caused by a fuel spill at the launch pad. Wells located downgradient from a spill site could, however, be affected. The exact location of these wells would have to be identified in order to evaluate the potential for groundwater contamination and subsequent health, ecological, and agricultural effects.

Because there is a potential for groundwater contamination during a spill in which rocket fuel is released to the ground without secondary containment, mitigation measures (including containment systems) will be implemented in order to prevent soil contamination from spill events at the propellant storage, payload processing and launch areas of the proposed facility. As stated in the DEIS (Volume I, page 5-35):

> *"State and Federal regulations require that propellant storage areas incorporate proper containment. Design of the propellant storage, payload processing and launch areas must include containment. Liquid fuel storage tanks will be surrounded by dikes, barricades, berms or other suitable protective mounds. Reservoirs will have a capacity 10 percent greater than the propellant storage tanks. These measures will limit the surface area of a spill and prevent the contents of tanks from mixing with incompatible material that could result in fire, explosion or toxic conditions. The containment areas will have impervious linings to protect groundwater from contamination."*

According to the groundwater resources investigation prepared by Harding Lawson Associates (DEIS Volume III, Appendix B), the largest accumulated amounts of liquid fuels in single vessels without secondary containment will be at the launch pads. The fuel spill scenarios evaluated in the HLA investigation are assumed to occur at the central launch pad which is about 1,500 feet inland from the ocean shore.

In the HLA investigation, two types of fuels are assumed to spill in a sudden accident from fully fueled rockets and infiltrate the subsurface in a limited area near the launch pad: 615 gallons of Aerozine-50, a liquid fuel used in Delta rockets that is a mixture of hydrazine and UDMH and miscible with water, and 15,676 gallons of kerosene (RP-1), a liquid fuel used in Atlas rockets that is immiscible with water. On page 16 of the groundwater resources investigation, HLA states:

> *"Conceptually, fuels released over the ground surface are expected to infiltrate, percolate downward through the unsaturated zone to the groundwater surface, and then migrate horizontally with the groundwater either as a solute (in the case of miscible liquids) or a floating separate-phase liquid. Groundwater in the area of the proposed spaceport generally flows seaward and discharges from the subsurface at the shore of the ocean as dispersed fresh or brackish springs."*

The well inventory attached to the HLA report (DEIS Appendix IIIB, Table 1) shows that existing drinking water wells are located inland from the proposed facility - near the town of Pahala and along the highway to the south of the site (see also the groundwater hydrology map in Plate 3 of the HLA report). The launch pads and other Spaceport facilities are downgradient from these wells, therefore, they would not be affected by spills at the launch site.

Because of the remote possibility that some groundwater sources might be downgradient of a spill, dosages, cancer risks, and noncancer hazard indices for ingestion of contaminated groundwater are quantified. These analyses are conservative overestimates, however, because the mitigating effect of the concrete launch pad is not included. In other words, the analysis does not assume any containment, barrier, or other obstacle to the downward migration of the spilled material.

Spills Involving Aerozine-50. The results of the groundwater modeling studies conducted by HLA (DEIS Appendix IIIB, page 19) indicate that, in the case of a spill of 615 gallons of Aerozine-50 at the launch pad:

> *"Aerozine-50 would percolate vertically from the spill site and reach groundwater about five days after the spill. The daily amount of fuel reaching the groundwater increases until about 20 days and then decreases asymptotically. In the groundwater, Aerozine-50 would dissolve in groundwater and migrate toward the shore. The affected groundwater zone would spread laterally toward the shore and discharge into the ocean in a zone approximately 2,000 feet wide. The maximum peak concentration would be approximately 11 milligrams per liter (mg/l) at the shore near the center of the zone and would decrease in both directions along the coast. Aerozine-50 would reach the shore approximately 20 days after the spill occurred and continue discharging with the groundwater for about a year."*

This is a conservative overestimation because the mitigating effect of the concrete launch pad is not considered.

In the following analysis, it is assumed that 50% of Aerozine-50 is hydrazine and 50% is UDMH. Dose, risk, and hazard index due to ingestion of groundwater contaminated with Aerozine-50 is quantitatively evaluated below.

$$\text{Intake} = \frac{C_w \times IR \times EF \times ED}{BW \times AT}$$

where:

Intake	=	lifetime average daily exposure, mg/kg/day
C_w	=	concentration in groundwater, mg/l
IR	=	ingestion rate, 2 l/day
EF	=	exposure frequency, 350 days/year
ED	=	exposure duration, 1 year
BW	=	average body weight, 70 kg
AT	=	ED x 365 days/year for noncarcinogens
	=	70 years x 365 days/year for carcinogens

Assuming that the maximum concentration of hydrazine and UDMH estimated in the groundwater modeling (5.5 mg/l each) occurs in groundwater for a period of 1 year, and assuming that all drinking water is from contaminated groundwater, the lifetime average daily dose of hydrazine and UDMH would be 2.2×10^{-3} mg/kg/day for the carcinogen risk assessment and 0.15 mg/kg/day for the noncancer hazard index analysis. Applying the oral potency factors for hydrazine and UDMH (3.0 $(mg/kg/day)^{-1}$ and 0.3 $(mg/kg/day)^{-1}$, respectively) results in an overall cancer risk due to ingestion of contaminated groundwater of 7.3×10^{-3}, a risk significantly greater than the generally accepted insignificant risk level which is often defined as 1×10^{-6}.

Applying the noncancer acceptable exposure levels used in the risk assessment for hydrazine and UDMH (5.71×10^{-4} mg/kg/day and 5.71×10^{-4} mg/kg/day, respectively) results in a cumulative hazard index of 2.6×10^{6}, which is significantly greater than the nonsignificant hazard index level of 1.0. Thus, as stated in the DEIS (Volume I, page 5-134):

> *"...the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the Ocean." For a spill involving 615 gallons of Aerozine-50 in a fully fueled Delta II rocket, this will occur within a period of about 1 year. Contamination of existing drinking water wells will not occur under this spill scenario, however, because these wells are located upgradient from the launch pads. This analysis does not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material."*

Spills Involving Kerosene. Groundwater modeling studies were conducted by HLA to evaluate spills involving 15,676 gallons of kerosene, a liquid fuel that is immiscible with water. The studies indicate that:

> *"...it [kerosene] would percolate vertically from the spill site and reach the groundwater approximately 15 days after the spill occurs. The daily amount of fuel reaching the water table would increase until about 40 days and then decrease asymptotically. Unlike Aerozine-50, the kerosene would float on the groundwater surface as a thin separate layer. It would spread laterally in the direction of the groundwater gradient, which is toward the shore. It would eventually migrate to the shore in a zone approximately 3,500 feet wide and cover an area on the water table of approximately 50 acres. The kerosene would seep into the ocean at the shore for a period of 3.3 years. The peak discharge rate for kerosene would be approximately 320 pounds per day along 3,000 feet of shore. (DEIS Appendix IIIB, page 19)."* Thus,

> *"...the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the Ocean." For a spill involving 15,676 gallons of kerosene in a fully fueled Atlas II rocket, this will occur within a period of about 3.3 years. Contamination of existing drinking water wells will not occur under this spill scenario, however, because these wells are located upgradient from the launch pads. This analysis does not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material (DEIS Volume I, page 5-134)."*

Soil and Water Degradation of Hydrazine and UDMH. The half-life of hydrazine in soil is listed as ranging from 1-7 days while the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992).

The half-life of hydrazine in groundwater is listed as ranging from 2-14 days while the half-life of UDMH in groundwater is listed as ranging from 16-44 days (Howard 1991). In the evaluation of spills involving Aerozine-50, it is estimated that after a spill at the launch pad, the Aerozine-50 would reach the shore approximately 20 days later and continue discharging with the groundwater for about a year. After a period of 20 days, however, only about one-half of the original amount of hydrazine would be in the groundwater due to aquatic degradation and after a period of 40 days, one-half of that amount would remain along with one-half of the original amount of UDMH. Thus, discharge of these substances with groundwater would diminish over time due to aquatic degradation.

Summary of On-Site Spills. The preceding analyses of on-site spills represent a conservative overestimation because the mitigating effect of the concrete launch pad is not considered in the evaluations. In other words, these analyses do not assume any containment, barrier, or other obstacle to the downward migration of the spilled material. Thus, contamination of existing drinking water wells will not occur under these spill scenarios, however, because the wells are located upgradient from the launch pads. In addition, these analyses do not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material.

TRANSPORTATION SPILLS

The intended transportation route from Hilo Harbor to Palima Point is via Highway 11 (DEIS Volume I, page 5-34). The transportation route, which is about 52 miles long, goes through Hilo, Mountain View, Pu`u Makaala, Volcano, Ka`u Desert, Wood Valley, and Pahala. Representative potential accident locations considered in the analysis are shown on Figure V-2.1 of Volume I of the dEIS.

Transportation of liquid propellant chemicals is regulated by the U.S. Department of Transportation and hazardous drums and cylinders must conform to DOT specifications (DEIS Volume I, page 5-39). The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to puncture because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to

carry hazardous materials (ACTA Inc., DEIS Appendix VIA and DEIS Volume I, page 5-54). According to ACTA:

> *"...the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."*

ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than 1 drum or 1 cylinder per truck accident is considered to be unlikely.

Accident rates along the transportation route were based on accident statistics for each road segment evaluated for all vehicle types, which is likely to be an overestimate of the truck accident rate.

> *"Historically trucks carrying hazardous materials have a lower accident rate than that for other vehicles (DEIS Volume I, page 5-39)."*

Nevertheless, RSA evaluated potential health effects from transportation spills at eight representative potential accident locations along the Hilo-Palima Point transportation route. The analyses assume a 15-minute blanketing time for spill remediation.

> *"It is assumed that within this 15-minute blanketing time, the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it (DEIS Volume I, page 5-45)."*

Due to the quick clean-up and removal by the HAZMAT team accompanying the transportation truck, minimal impacts will occur to soil and groundwater due to spilled material.

REFERENCES

Hazardous Substances Data Bank (HSDB). 1992. Electronic communication with HSDB of the National Library of Medicine.

Howard, P.H. 1991. Handbook of Environmental Degradation Rates. Chelsea, Michigan: Lewis Publishers, Inc.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

September 29, 1993

REPLY TO ATTENTION OF:

Planning Division

Office of Environmental Quality Control
State of Hawaii
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Sir/Madam:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point, Island of Hawaii (TMK 9-6-2: por. 1-6, 9-10, 20, 28, 42-49; and 9-6-13: por. 3, 5, and 6). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. Construction of facilities and access roadways that involves placement of fill or structures in gulches or drainageways may require a DA permit. Please consult with our Operations Division at 438-8554 when the engineering plans are developed and refer to file number PO93-084.

b. According to the enclosed Federal Emergency Management Agency's Flood Insurance Rate Maps, panel numbers 155166-1695C and 155166-1725C dated September 16, 1988, the proposed project sites are located in Zone X (unshaded; areas determined to be outside of the 500-year floodplain).

Should you require additional information regarding the flood hazard information, please contact Ms. Jessie Dobinchick of our Planning Division at 438-7008.

Sincerely,

Kisuk Cheung, P.E. for
Director of Engineering

Enclosure

Copy Furnished:

Mr. Ken K. Munechika
Department of Business, Economic Development and Tourism
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A — No base flood elevations determined.

ZONE AE — Base flood elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 — To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V — Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X — Areas determined to be outside 500-year flood plain.

ZONE D — Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

(D) — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7 X — Elevation Reference Mark

• M20 — Control Stn

*Referred to the National Geodetic Vertical Datum of 1929

NOTES

Flood is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

HAWAII COUNTY, HAWAII

PANEL 1695 OF 1900
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
155166 1695 C

MAP REVISED:
SEPTEMBER 16, 1988

Federal Emergency Management Agency

CUSTOMER COPY

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A — No base flood elevations determined.

ZONE AE — Base flood elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

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Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

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RM7 X — Elevation Reference Mark

• M20 — Control Stn

*Referred to the National Geodetic Vertical Datum of 1929

NOTES

Flood is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

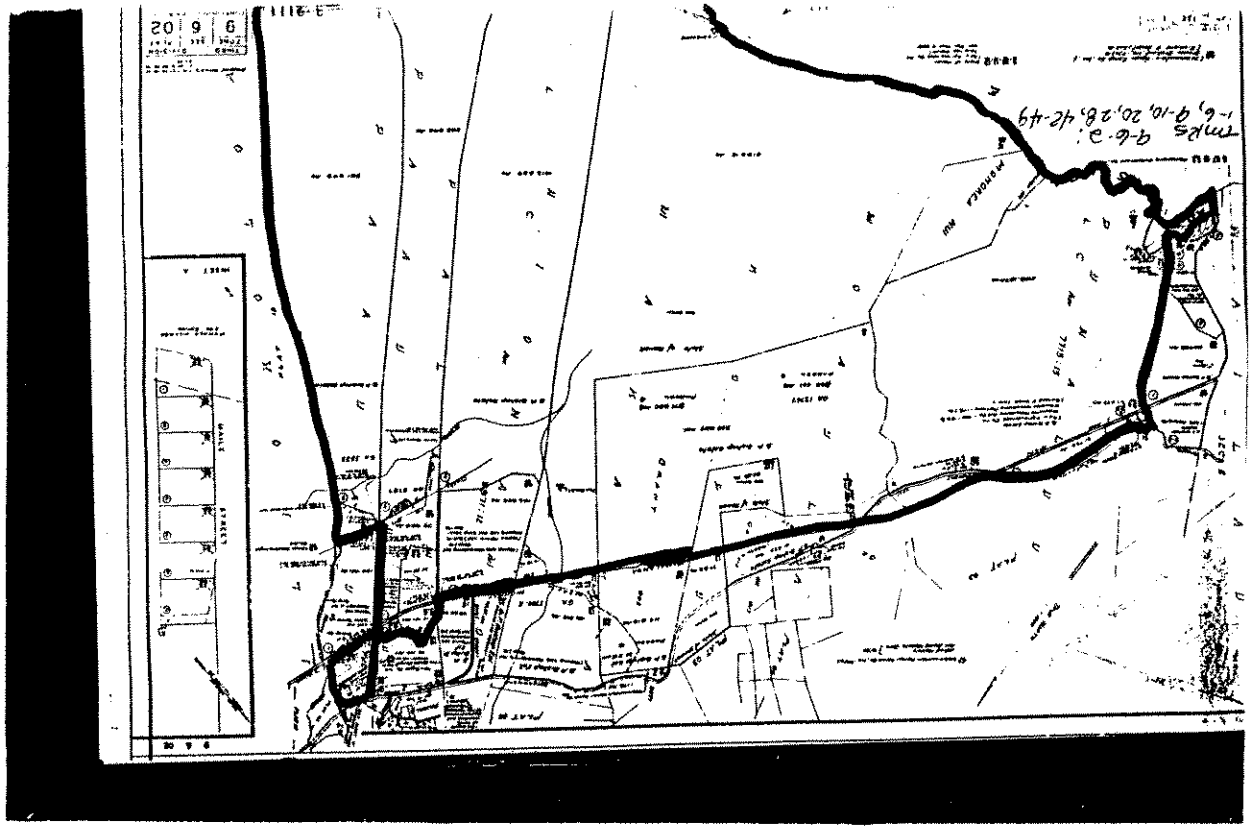
HAWAII COUNTY, HAWAII

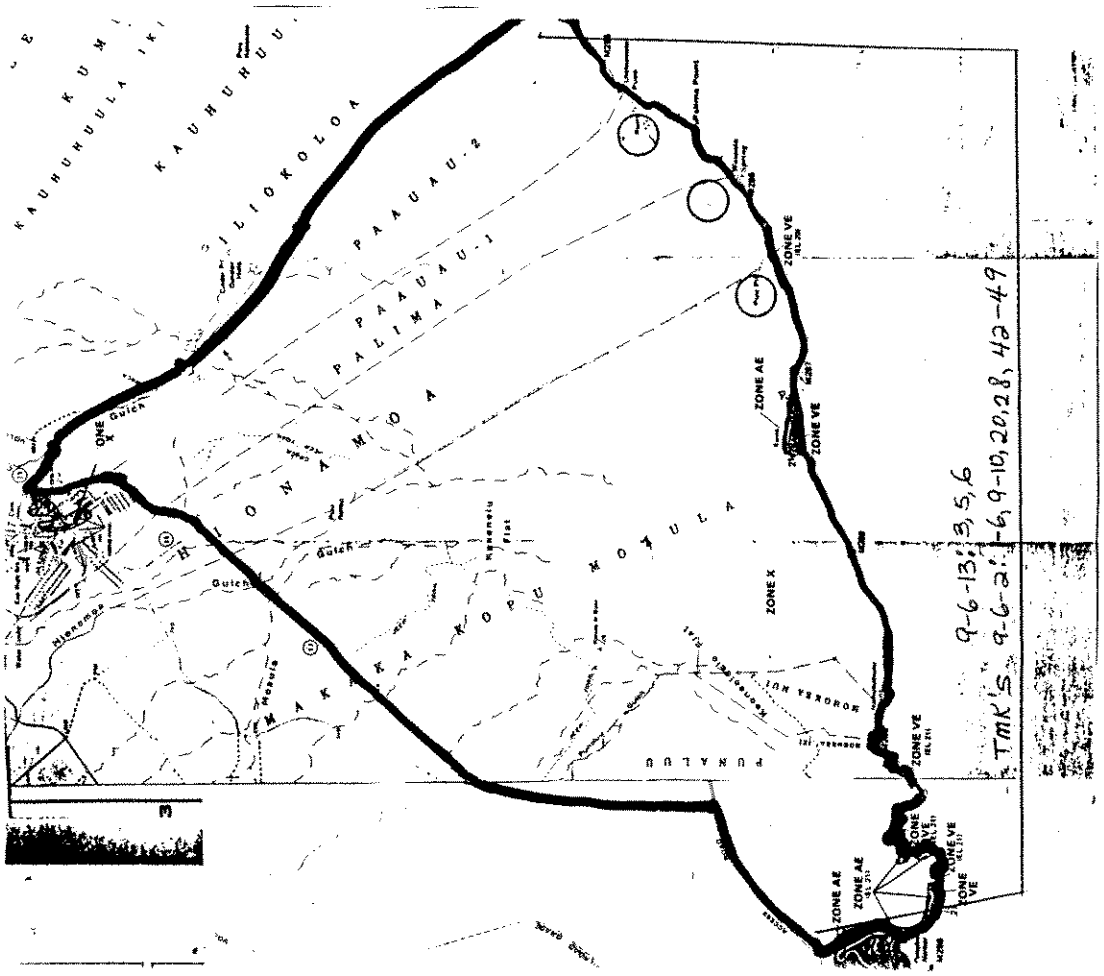
PANEL 1725 OF 1900
(SEE MAP INDEX FOR PANELS NOT PRINTED)

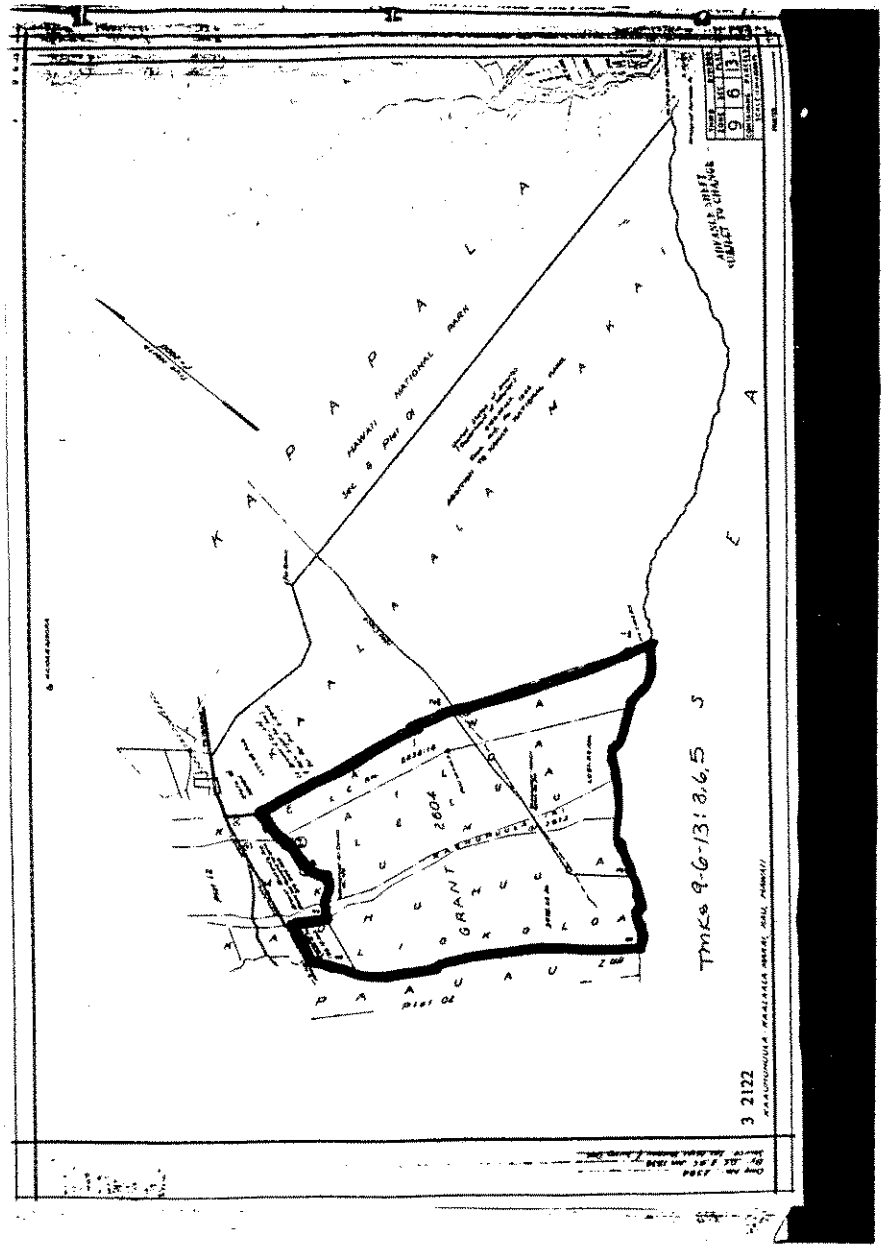
COMMUNITY-PANEL NUMBER
155166 1725 C

MAP REVISED:
SEPTEMBER 16, 1988

Federal Emergency Management Agency


TMK's 9-6-3:
1-6, 9-10, 20, 28, 42-49


KAUHUHUULA
PAAUAU-2
PAAUAU-1
PALIMA
HIONAMOA
MAKAKA KOPU MOKULA
PUNALUU
ZONE AE
ZONE VE
ZONE X
9-6-13: 3, 5, 6
TMK's 9-6-2: 1-6, 9-10, 20, 28, 42-49



DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

JOHN W.
GO
JEANNE K. SC
DIR
RICK E
DEPUTY DIR
TAKESHI YOSH
DEPUTY DIR

SEP. 30 1994

Mr. Kisuk Cheung, P.E.
Director of Engineering
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Ft. Shafter, HI 96858-5440

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Chueng:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

SEP. 30 1994

In response to your specific comments:

- Facilities and access roads are only conceptual at this time. More detailed studies will be prepared if and when there is an actual project to be designed. If required, the developer will apply for a DA permit.

- A preliminary drainage and flooding study was completed for the project site by Parsons Hawaii in November 1991, and is included in Volume V of the dEIS as Appendix C. More detailed studies will be prepared when and if there is an actual proposed project.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Department of the Interior
United States Geological Survey
Hawaiian Volcano Observatory

Phone: 808-967-8819 David A. Clague Fax: 808-967-8890
P.O. Box 51
Hawaii National Park
Hawaii 96718

Mr. Bert Toma
Office of Space Industries
State of Hawaii DBEDT
P.O. Box 2359,
Honolulu, HI 96804

Feb. 22, 1994

Dear Mr. Toma:

We have reviewed the Geologic Hazards section of the Draft EIS for the proposed Palima Point Commercial Satellite Launching Facility. The analysis for lava flow hazards is in general quite good. In particular, the estimates of a 50% chance of lava inundation in a 50-year timespan is supported by the past history and percentage coverage downslope of the southwest rift zone. The roughly 5% chance of lava inundation for the remainder of the site is also supported by existing data. However, the third paragraph under "potential effects" on pg 4-3 in V.1 is not supported. The relatively recent history of Kilauea's activity is the only part of the history that is relevant to assessment of present and near-future hazards. That the longer term hazard might be less is of little consequence. The conclusion that the lava flow risk varies from moderate to high is accurate, but misleading as it gives the impression that the risk is poorly known. We recommend that you state that the "risk of inundation by lava flows at the Palima Point site varies from high in the area downslope of the Kilauea southwest rift zone (the launch area) to moderate elsewhere."

We also feel that the very high probability of lava inundation (50% in 50 years) proposed by ACTA Inc. have been buried in an appendix to Appendix A. This certainly gives the impression that this is information that the EIS does not want to highlight.

The author of Chapter 4 notes that there are differences of professional opinion as to the validity of the probability estimates. In view of the very high probability of lava flow inundation within the lifetime of the project given by the ACTA report, this point seems important to clarify. We recommend that a greater effort be made to discuss these statistics with as many qualified professions as possible, rather than neutralize the ACTA report by stating that it "may be correct," but on the other hand, "such quantification may not be justified." I realize that the view presented is that of Dr. Jack Lockwood of the Observatory staff. However, even Jack recognizes that the short-term probability is the one that matters when making short-term land-use decisions. Jack has spent much of his career trying to determine the long-term risks posed by Mauna Loa and he sometimes loses sight of the validity of short-term risk assessment. It remains that all three of the launch facilities are in lava hazard zone 1, which means that the risk of lava inundation is high.

Another hazard, the corrosive action of the volcanic fumes emitted by Kilauea during the on going 11-year long eruption receives insufficient attention. The sulfur dioxide in the fume combines with atmospheric water vapor to form sulfuric acid, resulting in acid rain. In Appendix A there is only a single mention of the adverse effects of acidd rain on exposed metal. The EIS should address this issue in much more detail, as it could prove to be a serious problem at the launch facility

Sincerely,

David Clague

David Clague
Scientist-in-charge

12-22

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

JOHN W. ... GOV.
JEANNE K. SCH... DIR.
RICK E. ... DEPUTY DIR.
TAKESHI YOSHI... DEPUTY DIR.

SEP. 30 1994

Mr. David Clague
Scientist in Charge
U.S. Dept. of the Interior
Hawaiian Volcano Observatory
P.O. Box 51
Hawaii National Park, HI 96718

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Clague:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc. contributed to the following responses.

GENERAL COMMENTS

The draft report - "Probabilistic Analysis of Inundation by Lava Flow From Volcanic Activity" by ACTA Inc., 1993 - was sent to your office for pre-publication review. Your reviewer's comments are paraphrased on page 4-3 of the dEIS and state:

> *Although the values may be correct, the period of historic observation of lava flow activity on Hawaii is very short, therefore quantification may not be justified. The probabilities give a rough idea of the hazard, but are best regarded as semi-quantitative assessments and should not be considered as hard statistical data.*

Section 11-200-16 of the Environmental Impact Statement Rules (Title 11, Chapter 200) states that "....this statement [draft EIS] must include responsible opposing views, if any, on significant environmental issues raised by the proposal." We considered comments from a respected scientist to be "responsible views" and therefore we published the statement. Publication of your letter in the Final EIS will present another view.

It should be noted that rather than burying factual information on lava flows, Figure IV-1.1 in Volume I of the draft EIS, "Volcanic Zones at Palima Point", graphically shows that the launch pads are in Lava Flow Hazard Zone 1, the most hazardous zone. In addition, all of the Technical Appendices were published and made part of the draft EIS. The section "Potential Effects" (DEIS Volume I, page 4-3) refers to the probabilistic analysis in Appendix III-A in the first sentence of the first paragraph.

As stated in the cover letter, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement would have to be completed before a launch facility could be developed at Palima Point. If and when a private developer proposes an actual project, lava flow hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

SPECIFIC COMMENTS

Comment: *The risk of inundation by lava flows at the Palima Point site varies from high in the area downslope of the Kilauea southwest rift zone (the launch area) to moderate elsewhere.*

Response: The first paragraph of Potential Effects (DEIS Volume I, page 4-3) will be revised as follows:

> *A probabilistic analysis of inundation by lava flows was prepared (ACTA Inc. in HLA, DEIS Appendix IIIA). The analysis concludes that the risk of inundation by lava flows at the Palima Point site varies from high in the area downslope of the Kilauea southwest rift zone (the launch area) to moderate elsewhere. ACTA predicts that the area along and immediately downslope of the Southwest Rift Zone (SWRZ) of Kilauea has the highest potential for burial about 50 percent during a 50-year time span. Recent intrusive activity along the SWRZ (1981-82) may signify that an eruption in this vicinity is very likely in the near future.*

Comment: *Another hazard, the corrosive action of volcanic fumes emitted by Kilauea during the on-going 11 year eruption receives insufficient attention.*

Response: Acid rain and vog (volcanic smog) are described in Volume II, Chapter Five of the dEIS. They are well recognized hazards on the Island of Hawaii, causing respiratory problems for sensitive people. Acid rain is a local environmental problem that already exists - whether or not a spaceport is constructed in the area - due to the volcanic activity on the island. Although effects of these corrosive deposits on metal and other industrial equipment were not specifically addressed in the dEIS, acid rain would be considered in the design and operation of the spaceport in terms of maintaining equipment and facilities in good operating condition.

Both Cape Canaveral AFS and Vandenberg AFB are experienced with corrosion problems as both are located along coastlines in middle latitudes where salt spray is abundant. Furthermore, because space launch vehicles carry highly corrosive rocket fuels they are designed to withstand these corrosive reagents. Components of gases emitted from rocket exhaust include HCl, which forms acidic droplets when mixed with the pad cooling flush water. Consequently, launch pads are designed to withstand acidic rain, and are maintained accordingly. Washdown of facilities and careful maintenance is required to withstand the effects of the corrosive atmosphere at CCAFS; similar procedures would necessarily be applied at Palima Point. Vandenberg AFB has had a Corrosion Control Program in continuous operation, led by a Corrosion Control Engineer who specified appropriate paints, schedules for sand-blasting and painting, washdowns, and so forth to keep the facilities in good condition. The cost of maintenance and operation of the Palima facility to combat corrosion should be comparable to that at Cape Canaveral and Vandenberg.

Reference: Morrow, J.W., E.J. Morgan, A.N. Furuike, and T.A. Peters. 1991. Characterization of volcanic aerosol in two populated areas on the Island of Hawai'i: First year findings of a three-year investigation: presented at the Air & Waste Management Association 84th Annual Meeting and Exhibition, Vancouver, British Columbia, 16-21 June.

NOV 1 2 1993

United States Department of the Interior

GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
677 Ala Moana Blvd., Suite 415
Honolulu, Hawaii 96813

November 10, 1993

Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Governor Waihee,

Subject: Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point, Draft Environmental Impact Statement (DEIS), Ka'u, Hawaii

We are in receipt of the subject DEIS. We regret that due to prior commitments, we are unable to review the subject DEIS by the November 22nd deadline.

As requested, we are returning the DEIS to your office for your future use.

Sincerely,

William Meyer
District Chief

Enclosures

cc Mr. Takeshi Yoshihara, Deputy Director
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

August 10, 1993

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
HONOLULU, HAWAII
AUG 1 6 1993
RECEIVED

Dear Recipient:

The Department of Business, Economic Development & Tourism is pleased to provide you with the State Draft Environmental Impact Statement (EIS) for a commercial satellite launching facility proposed for the Big Island of Hawaii. It was filed with the Office of Environmental Quality Control on August 10, 1993.

The complete EIS is comprised of ten volumes, of which volumes I and II are the principal volumes. Complete ten-volume sets are available in regional public libraries for your review.

Due to the length of the EIS, the required review period of 45 days has been doubled. A 90-day review period will begin on August 23, 1993, and end on November 22, 1993.

Comments on the EIS should be sent to:

Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

with a copy to:

Department of Business, Economic Development & Tourism
Attn: Mr. Takeshi Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

Sincerely,

Mufi Hannemann

Enclosure

JOHN WAIHEE
GOVERNOR

BRIAN J. J. CHOY
Director

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185

Dear Participant:

Attached for your review is a Draft Environmental Impact Statement (DEIS) which was prepared pursuant to the EIS law (Hawaii Revised Statutes, Chapter 343) and the EIS rules (Administrative Rules, Title 11, Chapter 200).

TITLE OF PROJECT: CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT

LOCATION: *ISLAND* Hawaii *DISTRICT* Ka'u

TAX MAP KEY NUMBERS: 4-6-2: portion 01-06; 09; 10; 20; 28; 42-49 and 9-6-13: portions 03; 05; 06

AGENCY ACTION: X *APPLICANT ACTION:* _____

YOUR COMMENTS MUST BE RECEIVED OR POSTMARKED BY (minimum 45 day comment period): November 22, 1993

PLEASE SEND ORIGINAL COMMENTS TO THE:

ACCEPTING AUTHORITY: Governor, State of Hawaii
ADDRESS: c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813
CONTACT: _____ *PHONE:* _____

COPIES OF THE COMMENTS SHOULD BE SENT TO OEQC AND THE FOLLOWING:

PROPOSING AGENCY OR APPLICANT: Department of Business, Economic Development & Tourism
ADDRESS: Attn: Mr. Tak Yoshihara, Deputy Director
P O Box 2359
Honolulu, Hawaii 96804
CONTACT: Ken K. Munechika *PHONE:* 586-2380

CONSULTANT: N/A
ADDRESS: _____
CONTACT: _____ *PHONE:* _____

If you no longer need this EIS, please return it to OEQC. Thank you for your participation in the EIS process!

Draft EIS Cover Letter - Revision 8/92

United States Department of the Interior

NATIONAL PARK SERVICE
P.O. Box 37127
Washington, D.C. 20013-7127

27 DEC 1993

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

L76(774)
ER-89/0843

SEND COPIES TO APPROPRIATE PARTIES

Mr. Brian Choy
Director
Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Mr. Choy:

We have reviewed the Draft Environmental Impact Statement (DEIS) "Conceptual Plan for a Commercial Satellite Launching Facility" and have the following general and specific comments.

GENERAL COMMENTS

Although the document provides attention to Hawaii Volcanoes National Park concerns, especially in Volume II, Chapter 7, it is largely directed toward environmental compliance requirements of the State of Hawaii. Unfortunately, the document does not address the Federal National Environmental Policy Act (NEPA) requirements and as a result cannot substitute for an Environmental Impact Statement (EIS) under NEPA.

We are concerned that because this DEIS is regarded as a conceptual document, it fails to provide serious analysis of operational impacts of the Commercial Satellite Launching Facility and leaves a number of issues unresolved. It also appears to commit the State to a lengthy process of analysis and review. We fail to see any economy in this process when the alternative is to develop a comprehensive, joint Federal-State EIS.

While this document is considerably improved over the last draft reviewed by the National Park Service (NPS) in July 1993, we note that some of the problems previously pointed out to your consultants have not been addressed adequately. We are especially concerned that this document continues to ignore the park's status as a World Heritage Site and an International Biosphere Reserve. These designations not only are prestigious, but under international treaty, require that The World Heritage Committee (UNESCO) be notified of any threat to a World Heritage Site. We are unaware of any action on the part of the DEIS consultants or the State of Hawaii to notify this committee of such a threat.

12-26

This treaty also requires that the government of the host country must take legal steps to protect the threatened World Heritage site.

We are also concerned by the potential for harm to the park environment, visitors, and residents in the event of an accidental spill of toxic or hazardous material along the Highway 11 transportation corridor. The park's entire domestic water supply, residential areas, administrative offices, hotel and restaurant, and other visitor facilities are located in close proximity to this highway and well within the area of impact should a spill occur.

An additional major issue is the potential degradation of the quality of the Ka'u Designated Wilderness area (under the Wilderness Act 16 USC 1131 et seq) if the proposed space-launch facility is placed immediately adjacent to the park's boundary.

We believe the document is deficient in its discussion of mitigation of impacts upon air quality and scenic vistas. Although some attempt is made to describe impacts upon sensitive plants and animals, we note that mitigation measures often do not adequately protect certain species. We are especially concerned about nesting sea turtles, monk seals, pelagic birds, and rare plants. We believe that noises and visual pollution from artificial light from the facility pose significant threats which are not sufficiently analyzed in the document.

The document fails to seriously consider alternative sites for this proposed facility.

SPECIFIC COMMENTS

Additional comments and concerns related to editorial, conceptual, and biological matters in the DEIS follow.

1. Editorial

p S-13, S-5, S-50, etc.: There is frequent reference to "the three most sensitive habitats in the park." We do not recognize such areas and question the subject of the reference. Similarly, there is frequent reference to "ecological species" throughout. This suggests misunderstanding of the park environment. We suggest referring to species as native or alien, common or rare, invasive or passive, sensitive or durable. We think the writer intends to highlight indicator species, but fails to make this clear.

p 2-54, 4.0: The reference to "green sea turtles" as a permitted public activity is vague as is "entry to HVNP." How are these topics construed as "activities?"

p 3-24: The map indicating proximity of the nearest launch pad to the park needs to be examined for accuracy. We scale the distance at 3.0 mi, not 3.5, as noted in the text.

p 7-26: The reference to Kamoamoa Campground can be stricken. This campground and all surrounding features were obliterated by lava in October 1992.

2. Conceptual

p S-12, and v. II, ch 7: We are concerned in the failure throughout to recognize the park's interest in obtaining Tracts 27, 28 (2053 ac). This is a critical point as this extension of the park would truncate the Population Control Zone (PCZ). The site of the proposed project is identified for acquisition in the park's Land Protection Plan, however, the park has deferred any intent to acquire this land until such time as the State has ruled out any interest in using it for geothermal energy development. The State's assessment, that this land is not considered for geothermal development, re-activates our acquisition interest.

p S-12, 13: The document makes a good case for compatibility of PCZ with the undeveloped and open character of Ka'u section of the park-designated Wilderness. However, we disagree that industrial land use is appropriate for an area adjacent to Wilderness. We would like to have the opportunity to join with communities and the regional group of land managers in planning regional land use rather than reacting to this single proposal of questionable compatibility. We disagree with the characterization that a no-action alternative to the proposal would "put Ka'u adrift...."

p S-14 and v. X: Alternative sites discussion ignores eligibility of Hawaiian Home Lands (HHL) for development and results in an inadequate analysis of potential sites.

p S-15: We believe it is improper to engage in segmenting by excluding and postponing the analysis of a large runway and airport, to be analyzed in a later EIS. Impact on the park would be significant because of ingress and egress flight patterns. This amounts to incremental development with no valid assessment of cumulative impacts.

p 2-52: We are concerned about incidental development of roads and other facilities which would promote access to sensitive shoreline areas, especially Kamehame. The document fails to indicate that U.S. Fish And Wildlife Service (FWS) and National Marine Fisheries Service have been consulted on this impact.

Fig II-4.3: Please check the delineation of the boundary of conservation zone in the vicinity of Kamehame. A proposed road, parking lot, and toilet may be inside this zone. Also, there is no consideration of impact on turtle nest sites. Monk seals have also been seen recently in this area.

p 3-10: This section discusses the benefits of the spaceport to the visitor industry. We note a failure to acknowledge the park as a primary destination for Hawaii visitors and the impacts to park visitors resulting from the spaceport.

Fig III-2.3: Under lava flow data, symbol P6 is indicated on the map but is not keyed in the legend. Also, the magnitude of the 1823 flow, a major feature in the area, is diminished. Including an accurate depiction of the lava flow might more realistically indicate the threat that lava poses for any permanent features in the area.

p 7-29: We disagree with the statement that, "...cultural site complexes within the park and those within the PCZ are two distinct areas." Although it is true that the 1823 lava flow provides a modern topographic separation of features in the park from your proposed PCZ, the sites historically were part of a continuum which is now broken by the 1823 flow. Because the 1823 flow obliterated sites, it is especially important to recognize the relationships of sites extant in the park with those further west and beyond the 1823 flow.

3. Technical

p S-3: In this section the document recognizes lava and seismic hazards and that some infrastructure would be destroyed in a lava flow. However, it fails to describe what might happen if lava overruns fuel storage and other portable/hazardous items, such as a sensitive payload.

LIGHTS

p 2-42, 7-31: We remain concerned about new light sources in a pristine night-time viewshed. County ordinances and other regulatory measures do not adequately address this problem.

The employed Garstang model measures changes on general illumination, predicted by calculating direct light energy, directional, and reflective values. The model fails to consider human perception of new light sources and attitudes toward visible points of light. Also, the Garstang model is unverified. There is no basis for the Garstang conclusion, in Vol X-A, that the "average tourist" probably wouldn't be affected by changes in light patterns caused by the spaceport development? Conclusions such as this one need to be supported by social science research.

NOISE

p 4-10, 7-33 ff: Darby's noise model measures only sound levels, without distinguishing quality of sound. Park visitors and managers would distinguish anthropogenic and natural sounds. The Darby model needs to be verified. Darby's sound measurement tables are based on single, brief visits to selected sites, so levels indicated are artificial.

The invocation of an Oahu noise ordinance is irrelevant to the park situation, since Oahu noise regulations try to respond to nuisance tolerances for people living in an urban environment. It might be more tolerable to a city-dweller to hear jack-hammers and pile

drivers during the day, presumably when other urban noise would neutralize sounds. But this is entirely inappropriate for parks, when visitors are actively pursuing their nature and solitude experiences during daytime hours. The noise impacts on wilderness values of silence and solitude will be severe and without any possibility of mitigation.

p 3-14, Fig III-1.8: Wind patterns for Honuapa require better precision and a longer observation period. Honuapa is eight miles away from the project area. A 13-month observation period is inadequate since the wind patterns are complex and subject to change.

p 3-40: Meteorological data is based on a very limited observation period from a site eight miles from the project. In addition, the island is home to numerous microclimates. This may result in inadequate and inaccurate data leading to erroneous conclusions.

P 3-17, p. 5-96: We are pleased to see reference to a worst-case seismic event: a 8.0 earthquake during a fueling phase and contend that such information should discourage proceeding with the project.

p 4-3 through 7: Discussion of seismic and lava hazards indicate considerable exposure to earthquakes and lava flows. Proposed launch areas fall within the zone that the U.S.Geological Survey recognizes as having the highest hazard. Hazard rating is intended to inform potential developers in order to deter developments such as this one and we believe this information should receive serious consideration in making any siting decisions.

p 3-19: It is implied, then later confirmed, that ground water would be used for the project, but no characterization of the source and impact of water consumption on other users of the aquifer is offered. An analysis of water rights is appropriate in the document.

p 3-41: The vegetation analysis is inadequate. There is no discussion of status of native species, rare species, alien species that compete with natives, etc.

Also, we question the findings of Freed's bird survey. There is no indication as to how many days were spent in the project area in determining these findings.

p 3-44: We appreciate the recognition of Kamehame beach as an important hawksbill turtle nesting area, but recommend discussion of project impacts to off-shore foraging areas for green and hawksbill turtles.

p 4-15: We are concerned over impact of construction and rocket launch on Kamehame turtle nests. We believe analysis of vibrations, traffic, etc. would be appropriate prior to any commitment to development in this area.

p 5-107: We are concerned over debris from errant rockets raining onto Kamehame beach. The statement "...will have to be mitigated with FWS and NMFS" is vague. It is unclear how these agencies mitigate rocket debris rain and the potential impact of these activities on the budgets of these agencies.

Fig V-3.4 and 3.8: Maps indicate debris fallout over a part of the park under certain conditions. A clearer explanation of this needs to be made and the concomitant mitigation measures. In a prior statement in this DEIS, there was assurance that any debris would fall only into the PCZ. The maps included in the document contradict this statement.

p 7-36 through 47: We have critical concerns over the potential harm from spills along transportation corridors through the park from the port of Hilo. Residential areas and domestic water supplies are vulnerable to contamination following a transportation spill of hazardous or toxic material. Although the DEIS makes assurance that freight convoys will be escorted by hazardous material (HAZMAT) clean-up crews, we are not satisfied that the park's resources and personnel will be safe if certain materials spill into the road corridor.

We appreciate the opportunity to review and comment on this environmental impact statement. For any questions or information on the preceding comments, please contact either Jacob Hoogland, Chief, Environmental Quality Division or John Donahue at (202) 208-3163 or at National Park Service, U.S. Department of the Interior, 1849 C Street, N.W, Room 1210 MIB, Washington, D.C. 20240.

Sincerely,

For Denis P. Galvin
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SEP. 30 1994

Mr. Denis Galvin
Associate Director
U.S. Dept. of the Interior
P.O. Box 37127
Washington, D.C. 20013-7127

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Galvin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc., Cultural Surveys Hawaii, Engineering-Science, Inc., Dr. Roy Garstang, KRP Information Services, Risk Science Associates, Dr. Richard Brock, Leonard Freed and Char & Associates contributed to the following responses.

GENERAL COMMENTS

Comment: *The DEIS is directed toward environmental compliance requirements of the State of Hawaii and does not address the Federal National Environmental Policy Act (NEPA) and as a result cannot substitute for an Environmental Impact Statement under NEPA.*

Response: We find it difficult to respond to a general statement that the dEIS does not address NEPA. Although the document was never intended to substitute for an Environmental Impact Statement under NEPA, all of the NEPA content requirements (as of 1991 when the EIS was contracted) were incorporated into the document. The dEIS does not, however, address recent NEPA requirements nor all of the requirements of the Federal Department of Transportation, such as Section 4(f) and other Federal agencies. These project specific requirements will be addressed in a supplemental document--to be funded by the prospective developer--when a project is known.

Comment: *Because the DEIS is based on a conceptual plan it fails to provide serious analysis of operational impacts.*

Response: The dEIS addresses operational impacts by dealing with each hazardous procedure or situation under worst case conditions. The worst case includes evaluating impacts without the mitigating effects of standard operating procedures--operations plans. "Operations Plans" are management procedures and safety requirements that are established for each hazardous operation to prevent or minimize the consequences of accidents involving potential hazardous impacts.

An "Operations Plan" is a manual of written procedures that instruct employees to respond to a given situation in a prescribed manner. The operations plan also addresses the mechanical integrity of the equipment used to process, store, or handle hazardous substances. There are extensive federal compliance requirements concerning the development and approval of operating procedures (29 CFR Part 1910). A recent example of a detailed operations plan is the "step-by-step" procedures that were applied during the "in-orbit" repair of the Hubble Space Telescope.

If a specific project is developed, further hazard analyses and risk assessments would be required prior to licensing and obtaining required federal and state permits. It is emphasized that any additional hazard analyses performed for specific equipment and operating procedures will assume standard operating procedures are in place. It is likely, therefore, that such further analyses will yield less significant impacts than those presented in the dEIS.

Comment: *The DEIS leaves a number of unresolved issues and appears to commit to the State to a lengthy process of analysis and review, the alternative is to develop a comprehensive, joint Federal-State EIS.*

Response: "Unresolved Issues" is a content requirement of the State EIS Rules. In an initiative of this scope, the process of analysis and review should be as deliberate as possible. As a programmatic document with limited budget (compared to most Federal EISs of similar scope), the dEIS analysis identified several areas that need further study before an informed "go/no-go" decision can be made. It was a policy decision of the State to defer further studies until an actual project is imminent so that these studies could be funded by the prospective developer and not the State. The unresolved issues will be addressed in future environmental assessments and statements.

At this point in the planning process, whether or not to build a spaceport is a State issue. Federal requirements for a non-federal project--including the need for a federal EIS--are "triggered" by applications for federal licenses and permits and/or the use of federal funds. At the present time there is no applicant for a federal license or permit and there are no federal funds involved. In addition, a federal EIS at this stage of the process would be faced with the same constraint that limits the State document, that is, the lack of a specific project description.

Comment: *The document ignores the park's status as a World Heritage Site and an International Biosphere Reserve. UNESCO must be notified of any threat to a World Heritage Site.*

Response: The dEIS (Volume II) states that *"HVNP is recognized as an International Biosphere Reserve and a World Heritage Site."* The following will be added to this statement: *"These designations are not only prestigious, but under international treaty, require that The World Heritage Committee (UNESCO) be notified of any threat to a World Heritage Site."*

At the present time, there is no threat to a World Heritage Site as there is no project. In addition, it would be presumptuous of the consultants to notify a UN agency; they have no authority to speak for the State or the Federal Government. Should a specific project be proposed, appropriate federal agencies--those that have the authority to speak for the "host country"--would be provided, at their request, with all of the information developed during the EIS process.

Comment: *An accident involving hazardous materials could harm the park's environment, visitors, water supply, residential areas, and other ... facilities.*

Response. The potential effects resulting from transportation accidents are disclosed in Volume I (Chapter Five), Volume VI (Appendix A) and Volume VIII of the dEIS. Chapter 7 of Volume II deals specifically with potential effects to Hawaii Volcanoes National Park. The dEIS recognizes the need for further study with respect to transportation risks, as noted on page S-16 and 1-5 of Volume I. Please refer to the attached discussion by Dr. Alvin Greenberg on this issue (Attachment A).

Comment: *Although some attempt is made to describe impacts upon sensitive plants and animals, we note that mitigation measures often do not adequately protect certain species. We are especially concerned about nesting sea turtles, monk seals, pelagic birds and rare plants.*

Response: Potential adverse effects to sea turtles and monk seals associated with the proposed Palima Point Spaceport and proposed mitigation measures are discussed below. While it is noted that other factors could potentially impact these species, this response will focus primarily on the potential impacts due to exposure to chemicals. As stated in Volume VIII of the dEIS, there is a potential for adverse impacts to avian and plant receptors due to conflagration and deflagration events and transportation and on-site spills. The dEIS proposes mitigation measures wherever possible, however, the acceptability of these measures is left to be determined by the appropriate federal and state regulatory agencies.

Sea Turtles. Federally listed endangered green sea turtles (*Chelonia mydas*) and Hawksbill turtles (*Eretmochelys imbricata*) have been reported in the vicinity of Palima Point (DEIS Volume III, Appendix E). The area around Palima Point offers foraging for both turtle species. Green sea turtles migrate to French Frigate Shoals to breed (Balazs et al. 1994), while hawksbills nest mainly on beaches in the main Hawaiian Islands and have been found nesting at Kamehame Hill, Punalu`u Bay and Ninole Cove (Brock & Kam 1990; Balazs et al. 1994) and at Apua Point and Halape in Hawaii Volcanoes National Park (NOAA 1992). Based on recent surveys of the Palima Point area (Brock & Kam 1990; Balazs et al. 1994), the majority of sea turtles observed in the area are green sea turtles. In an inventory of the area, Brock & Kam (1990) only observed green sea turtles, and in surveys conducted since 1976, no hawksbills were captured at Punalu`u, although immature hawksbills were observed outside of the bay (Balazs et al. 1994). Brock & Kam (1990), however, did find evidence of hawksbill nests at Kamehame Hill.

Green sea turtles on the main islands of the Hawaiian chain do not bask on land, they only rest underwater on subtidal ledges where they have been known to stay submerged for two and half hours (NOAA 1991). Of the two species inhabiting the area, therefore, only female hawksbills leave the ocean to come ashore when they lay their eggs in nests on the beach (copulation takes place in the water).

As stated in Volume VIII, Appendix B of the dEIS, the main route of exposure to foraging sea turtles would be through inhalation of contaminants in the air (even if there were contaminants in the water it is very unlikely that they would be absorbed through the leathery skin of the turtles). Because toxic releases from rocket launches are of short duration, the actual dose of contaminant that a turtle would receive would probably be minimal. For example, a turtle resting underwater would have no exposure at all. If a turtle is at the surface when toxic fumes are released, the exposure would be intermittent. This is because turtles have a variable breathing pattern which consists of a period of apnea followed by several closely spaced breaths. Other activities at the site, such as light pollution and human disturbance, could potentially have a higher negative impact on turtles than the release of toxins into the atmosphere. These

potential impacts can be mitigated by a lighting plan (such as in place at Cape Canaveral) and management of human activities near nesting sites such as proposed in the Shoreline Access Management Plan.

Hawksbills would probably have the highest exposure to contaminants released by spaceport activities because they are the only sea turtles which come on land in the Palima Point area. Hawksbill females laying eggs or nestlings leaving the nest could inhale contaminants released during launch activities. Incubating eggs could also be exposed to contaminants in soils if contaminants from a spill were to reach the beach at Kamehame Hill. Considering the distance of Kamehame Hill from the launch pads and the propellant storage area, it is improbable that a spill would reach the beach. It is more likely that wet deposition of atmospheric contaminants could contaminate sand, thus exposing eggs and nestlings.

There is no available eco-toxicological data on the potential effects of exposure to contaminants that may be released from the spaceport to hawksbills, therefore, it is unknown what the impact may be, if any, to nesting turtles. In the absence of toxicological data, however, the most effective mitigation measure for nesting hawksbills would be to establish a sea turtle nesting preserve in the area surrounding Kamehame Hill (Brock & Kam 1990). This area could be routinely monitored for the presence of contaminants in the air and soil after launches as part of a Mitigation Monitoring Program.

In developing a Mitigation and Monitoring Program, care must be taken to establish the natural background levels and acidity and correct for acid and other deposition due to volcanic eruptions. It should be noted that the deposition of acidic substances from a launch is extremely small when compared to releases and deposition from the volcano. It must also be noted that historic exposure of turtles to these volcanic gases dwarfs any future exposure from rocket launches. It is extremely doubtful that acid emissions from launches would have an impact on turtles in the area unless there was a "direct hit" of a fragment from a destroyed rocket on hawksbill turtle breeding grounds. Nevertheless, a monitoring program may be useful to allay fears and serve as an early warning system.

A similar analysis can be made concerning organic emissions of hydrazine, UDMH, and other toxic chemicals. While the toxicological data base is unfortunately inadequate in regards to eco-toxic effects, if turtles are no more sensitive to the chemicals in question than the animal species tested as described in the literature (or humans, for that matter), it is doubtful that emissions under normal or accident scenarios would have a significant impact on turtles.

It is also unlikely that the turtles could be impacted via their food supply because the substances emitted are not bioaccumulated or concentrated in the food chain.

Monk Seals. The endangered Hawaiian monk seal (*Monachus schauinslandi*) haul out and rear pups on the beaches of the Northwestern Hawaiian Islands and are infrequently sighted in the main Hawaiian Islands (Johnson et al. 1982). Changes in the

Comment: *It is not appropriate to place the spaceport adjacent to Wilderness. We disagree that a no-action alternative to the proposal would "put Ka'u adrift...."*

Response: As stated in the dEIS, Volume II, page 7-29, it is true that *"...rocket launches will occasionally disrupt the wilderness character of the back country portions of the Park."* It is pointed out, however, that the facility includes a large undeveloped area adjacent to the Park that will remain in its wilderness state as open space. On page 7-26, the dEIS states, *"...it is unlikely that these lands will remain undeveloped indefinitely without a spaceport."* Although a spaceport would predispose Ka`u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the PCZ, the project area would be mostly open space.

The recent decision to close sugar operations places the economic future of Ka`u in question. Because there is no clear economic alternative for Ka`u at the present time, we believe that the no-action alternative could put Ka`u adrift.

Nevertheless, judgments about whether or not the development is appropriate or whether no-action will put Ka`u adrift must be made by community members, relevant government regulatory agencies and the Legislature. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

Comment: *Hawaiian Homelands should have been evaluated as potential alternative sites.*

Response: Hawaiian Homelands at South Point were evaluated as a potential alternative site during the 1988 Site Selection Study. The site was eliminated from further consideration because it failed to meet safety and operational criteria. The Kahilipali site includes Hawaiian Homelands within the PCZ. As stated in the dEIS, Volume II, Chapter Nine:

> *The Palima Point and Kahilipali Point sites were compared on the basis of the following factors, listed in descending order of priority: (1) environmental resources, (2) land ownership and the practicality of assembling a site, (3) recreational resources, (4) natural hazards, and (5) infrastructure. By all of the criteria evaluated--except for lava flow hazards--the Palima Point site was superior to Kahilipali. The environmental evaluations indicate that adverse impacts at the Kahilipali Point site would be more significant than at the Palima Point site. In addition, because of current land ownership and development conditions, it was anticipated that land at the Palima Point site could be assembled in a more timely fashion. The Palima Point site was therefore selected for the environmental impact analysis in the dEIS.*

In addition, portions of the Hawaiian Homelands within the PCZ at Kahilipali Point have recently been leased to Hawaiians who have been waiting for land for years.

Comment: *The potential on-site airport should have been addressed in the dEIS in order to assess total cumulative impacts.*

Response: For the purposes of the conceptual plan, DBED did not anticipate the requirement for an on-site airport. If a specific project that includes an on-site airport is proposed, cumulative impacts will be addressed in subsequent environmental assessments or impact statements.

Comment: *We are concerned about incidental development of roads and other facilities which would promote access to sensitive shoreline areas, especially Kamehame. The document fails to indicate the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service have been consulted on this project.*

Response: It should be noted that during the several trips made to the Kamehame Hill area during the field work conducted by Dr. Richard Brock (from 1990 to 1993), there was considerable evidence of fishermen camping on the beach (particularly at the southern end) in the form of tent pole structures, rubbish and firepits (a source of light as well as flashlights as evidenced by numerous expended dry cell batteries in the area). During one trip vehicles and campers were established on the south end of Kamehame Hill. Public concern over turtle nesting at Kamehame Hill is not borne out by the actions of the public. This does not make the proposed project "correct", but it points out the fact that disturbance to turtles attempting to nest on this beach has probably been ongoing for some period of time. With a management program in place that controls access and lighting, the situation should be better than it has been in the recent past insofar as sea turtle nesting is concerned.

The National Marine Fisheries Service approved the scope of the analysis for the dEIS. In addition, throughout the entire two years of his involvement in the EIS, Dr. Brock (the consultant) was in contact with Mr. John J. Naughton of the National Marine Fisheries Service with respect to the turtle populations and the study made at both Palima and Kahilipali areas. He also discussed with Mr. Naughton the issue of humpback whales (an endangered species). Mr. Naughton is the NMFS representative in charge of reviewing EIS documents with respect to endangered species and habitat alteration.

Comment: *The proposed road, toilet, and parking lot in the vicinity of Kamehame Hill may be in conservation zone, and could impact turtle nests and Monk seals.*

Response: The proposed road and parking lot are outside of the State Conservation District; the toilet facility is on Conservation District Land. The conceptual shoreline access plan is just that - a concept; it is a starting point from which discussion can be generated for the development of the final plan. If a toilet is located within the conservation district in the final plan, a Conservation District Use Permit will be required. It should be noted that any shoreline access plan will recognize the sensitivity of Kamehame Hill and beach because the US Fish and Wildlife Service and NMFS will be consulted during the development of the final plan (see DEIS Volume I, page 2-52).

With respect to impacts of such facilities to turtle nests, the DEIS (Volume III, Appendix E) provides information on impacts to turtles and their nests and recommends the following:

> *"If the proposed launch facility is developed, the entire area surrounding Kamehame Hill should be established as a sea turtle nesting preserve with no changes made to the surrounding vegetation. This concept should be considered by state coastal resource managers even if the launch facilities are not developed. A rigorous predator (rat, mongoose and feral cat) control program should be established to protect sea turtle nests from these predators."*

The presence of monk seals was not made apparent in routine conversations between Dr. Brock and Mr. Naughton (NMFS, Honolulu) during the preparation of the dEIS. While there have been occasional sightings off of HVNP (D. Taylor, personal communication with RSA. June, 1994), there is no information on their abundance, distribution or use of habitat in the area around Palima Point.

Monk seals occasionally utilize beaches and nearshore waters around the main Hawaiian Islands. These animals apparently select a beach and haul out on it for a period of hours to days. The selection of a beach and adjacent forage area appears to have nothing to do with the presence or absence of humans; some locations are on beaches that are heavily used by people along developed coastlines. With such lack of discrimination against human presence in selecting a beach, the existence or absence of a launch facility will probably have little direct influence to a seal hauling out on a beach such as that at Kamehame Hill. On the positive side, a Palima Point launch facility will probably control access and manage the use of coastal areas and resources. Such a program would probably assist in protecting an endangered species such as a monk seal using the beach as a haul-out site from intruding humans; protection without such a program may not exist.

Comment: *Page 3-10 fails to acknowledge the park as a primary tourist destination and impacts to park visitors from the spaceport.*

Response: The importance of HVNP in terms of its natural resources and as a major tourist destination is acknowledged in Volume II, Chapter Seven of the dEIS. On page 7-24, HVNP is described as "a major destination for many visitors." All potential impacts to HVNP and its visitors were considered and are covered in applicable technical appendices. Chapter Seven also that summarizes the project's impacts on HVNP and its visitors. Please refer to the response under General Comments for more detail on impacts to park visitors.

Comment: *Fig III-2.3 symbol P6 is indicated on the map but is not keyed in the legend. Also, the magnitude of the 1823 flow, a major feature in the area, is diminished. Including an accurate depiction of the lava flow might more realistically indicate the threat that lava poses for any permanent features in the area.*

Response: There is no p6 on the map, however, an area of p3 located above the southwest end of the Great Crack (Southwest Rift Zone) is smudged and could be mistaken for p6. This printing error has been corrected in the Final EIS.

The depiction of the 1823 lava flow is accurate based upon the mapping of the Pahala Quadrangle by Dr. C. A. Neal (1992). Perhaps it only appears diminished because the map in the dEIS is not in color. The 1823 flow is shown in red in Dr. Neal's mapping.

Comment: *We disagree that, "...cultural site complexes within the park and those within the PCZ are two distinct areas."*

Response: The archaeological survey of the coast has shown that archaeological sites and Hawaiian habitation are clustered in areas where there is access to the coast. The survey has also shown that archaeological sites within the 1823 lava flow, which covers much of the National Park boundary area is nearly devoid of archaeological sites, except in kipuka areas not covered by this flow. Both of these factors contribute to the existence of an archaeological barren zone within a half mile or more on either side of the National Park boundary (both inside and outside of the Park). As stated in the archaeological report, the nearest archaeological sites within the park boundary lie approximately 7000 feet from the nearest habitation sites along the coast west of the park boundary (the Punahaha lava tube complex).

It is true that the 1823 lava flow could have covered archaeological sites and that these areas could once have been connected by continuous sites. We will never know the answer to this question. The settlement pattern showing habitation clustered in areas with access to the coast, however, and absence of sites in steep cliff areas (characteristic of the National Park boundary area) indicate what has always been a barren area, even before the 1823 lava flow.

For the reasons stated above, the conclusions reached in Volume IV are still thought to be valid. The conclusions, however, are based upon spatial (topographic and geographic) relationships. The more difficult question of cultural relationships between these spatially separated areas is not addressed. There probably was prehistoric and early historic contact between coastal settlements, which extended mauka/makai, as well as parallel to the coast via canoe transportation, and along coastal trails.

TECHNICAL COMMENTS

Comment: *The dEIS (p S-3) fails to describe what might happen if lava overruns fuel storage and other portable/hazardous items, such as a sensitive payload.*

Response: Page S-3 is part of the Summary; more detailed information is found in Volume I, Chapter Four and in Volume III, Appendix A.

If an eruption were known to be imminent, or underway, some "portable/hazardous items" and "sensitive payloads" could be removed before being overrun by lava. Such eruption prediction or forecasting has been successfully implemented by monitoring magma movements using seismicity data (and listening for volcanic tremor, etc.). More significantly, lava inundation of the entire Palima Point launch facilities would effect a complete permanent shut-down of the operation. Detailed contingency plans for such a shut-down will be adopted and regular drills will be conducted to ensure that all potentially hazardous facilities will be secured in such a manner their destruction will not present a threat to humans or animals. Such procedures are required to be in place for facilities handling toxic materials.

Comment: *Concerns remain about the adequacy of the county lighting ordinances addressing the pristine night-time viewshed. The employed Garstang model fails to consider human perception of new light sources and attitudes toward visible points of light. Conclusions such as the "average tourist probably wouldn't be affected by changes in the light patterns" need to be supported by social science research. The Garstang model is unverified.*

Response: Please refer to the discussion at the end of this letter which supports our original conclusion (Attachment B).

Comment: *Darby's noise model measures only sound levels, without distinguishing quality of sound. Park visitors and managers would distinguish anthropogenic and natural sounds. The Darby model needs verification, Darby's sound measurement tables are based on single, brief visits to selected sites, so levels indicated are artificial. Urban noise ordinances are irrelevant in a rural environment.*

Response: Although there is no "Darby" model used for preparation of the dEIS, as noted in Volume VII, Appendix B, sound propagation tests and measurements were performed for the dEIS. Results of those measurements were used to predict noise levels attributable to launch facility operations (using ray tracing techniques) perceived at seven receptor locations under various meteorological conditions. The measurements were taken over a four day period, during morning and evenings under varying weather conditions. The limitations of the study is recognized in the dEIS, therefore it is recommended that the following be instituted:

> *an..."on-going program of obtaining frequent meteorological data and sound propagation testing...[which] could lead to a better understanding of the local acoustical conditions. The goal is to predict which times of the day and which general weather conditions have very low, (or no) probability of sound focussing to populated areas in order to provide guidance in the long-term planning for rocket launches (Darby, DEIS Volume VII, Appendix B)."*

Although there was no attempt to distinguish between the natural and man-made elements of existing ambient noise at receptor locations, background noise levels were taken into account during the sound propagation tests so that measurements taken from

the operation of the man-made noise source were distinguished. As noted in the dEIS (Ibid.), with the exception of rocket launches, all other noise sources from the facility are expected to be inaudible at the park with the implementation of stock mitigation measures. Rocket launches would be infrequent and short-term in nature, therefore unlikely to cause serious disturbance to the park environment. Moreover, during favorable conditions, audible frequencies from rocket launches would resemble noise from distant thunder, calling into question the assumption that park visitors and managers would be able to distinguish between anthropogenic and natural sounds.

In addition to covering federal and state noise ordinances, Volume VII, Appendix B of the dEIS includes the Geothermal Noise Guidelines which were developed specifically for the County of Hawaii--specifically for the rural area of Puna where geothermal activities take place. As noted in the text, the guidelines differ from state DOH regulations in that the noise levels are monitored at the receptors, rather than at the property line; and that the nighttime penalty is applied between 7:00 pm to 7:00 am rather than 10:00 pm to 7:00 am.

Comment: *The Honuapo wind data is inadequate and may have led to erroneous conclusions.*

Response: The limitations of the Honuapo wind data are stated numerous times in the document. Because of the limited data, for the purposes of computer modeling the wind was assumed to be blowing in the direction of populations and sensitive receptors at all altitudes in order to achieve the highest downwind estimates of pollutants. Therefore, it is most likely that any subsequent modeling that is performed with actual wind measurements would yield less significant potential impacts than those produced in the conceptual plan. Please refer to Volume I of the DEIS, pages 5-81 and 5-82 for a discussion of basic weather assumptions.

The limited weather data available from the Palima Point site--and the high cost associated with the acquisition, processing and interpretation of such data--precluded more robust, statistical analysis of the effects of weather conditions for this preliminary analysis. If a launch facility were to be constructed at the site, the dEIS specifically recommends a more comprehensive meteorological monitoring program (Volume I: pages S-15 and 5-82 and Volume II: page 8-17) prior to operation of the launch facility. This recommendation states:

> *"Extensive meteorological monitoring (of at least one years' duration) from ground level to the upper atmosphere must be conducted--and toxic dispersion/diffusion, explosive overpressure and debris models must be run for each specific rocket that will be launched--before the launch facility becomes operational."*

Furthermore, continuous monitoring of meteorological conditions during countdown is standard launch procedure. This requires establishment of a permanent weather station at the site.

Comment: *The possibility for an 8.0 earthquake during a fueling phase should discourage proceeding with the project.*

Response: An Earthquake Advisory Plan--based on the successful prediction (more appropriately "forecast") of earthquakes in several instances around the world--has been implemented by the State of California, Office of Emergency Services (California Earthquake Advisory Plan, 1990). In the mitigations section, this plan states:

> *"Move emergency vehicles out of garages or apparatus bays, or at least keep bay doors open....If feasible, move vehicles from dangerous locations to non-hazardous open areas."*

The unpredictability of earthquakes is recognized in the seismic risk report (DEIS Volume III, Appendix A). The report states that "A primary difference between volcano and earthquake risks is that volcanic activity is more predictable." Most earthquakes on the Island of Hawaii are associated with volcanic activity and the large damaging earthquakes are usually preceded by significant foreshock activity. A period of unusual seismic activity preceded the Great Ka`u earthquake of 2 April 1868, including several moderate foreshocks (Cox and Morgan, 1977). Significant foreshocks, including a M_S=5.7 event, were also felt prior to the 29 November, 1975 Kalapana earthquake. Thus, whenever seismologists at Hawaii Volcanoes Observatory (HVO) record enhanced seismic activity associated with magma upwelling, inflation or deflation, etc., an earthquake watch and warning system (such as implemented in California) could be engaged whereby imminent earthquake hazard could be recognized.

Hawaii is fortunate that magma movement and possible large earthquakes are associated with such precursory activity; volcanic eruption and earthquake advisories are possible. Although false alarms may be unavoidable when no large damaging earthquakes follow enhanced seismic activity, the simple mitigating procedures suggested in the dEIS (such as leaving fire suppression equipment outdoors and/or garage doors open on fire stations) would have negligible adverse consequences on regular activities at the spaceport or in the affected communities.

Hawaii is one place in the entire world where anticipation of damaging earthquakes based upon premonitory seismicity (or other precursory phenomena like ground uplift and subsidence) is likely to occur. The historical record of seismicity substantiates this proposition. These seismicity patterns have already been used successfully to predict major eruptions of volcanoes, including Mt. Saint Helen in Washington state, Mt. Pinatubo in the Philippines, and Kilauea in Hawaii.

Comment: *The launch pads are located in the highest hazard zone for earthquakes and lava flows, this information should receive serious consideration in making any siting decisions.*

Response: The dEIS includes a technical report relating to the seismic and volcanic hazards at Palima Point (Volume III, Appendix A). Because of the substantial private

capital required to build and operate the facility, in addition to satellites potentially worth hundreds of millions of dollars, earthquake and lava flow hazard information would receive serious consideration before investment decisions are made.

Comment: *It is implied, then later confirmed, that ground water would be used for the project, but no characterization of the source and impacts of water consumption on other users of the aquifer is offered. An analysis of water rights is appropriate in this document.*

Response: Groundwater resources are described in Volume I, Chapters Three and Four, and in more detail in Volume III, Appendix B of the DEIS. Sustainable yields for the two aquifer systems within the project area are estimated to be 134 mgd. Current water usage is calculated to be 12 mgd, of which approximately 82 percent is used by agriculture and industry. Since the dEIS was published, additional information on the water resources of the Ka`u area has become available. The Ka`u River Basin Study was published by the U.S. Department of Agriculture in February, 1994. None of the published reports on Ka`u water resources identify any significant water rights issues related to groundwater usage.

Comment: *The vegetation analysis is inadequate because there is no discussion of the status of native species, rare species, alien species, etc.*

Response: Please refer to Volume III, Appendix C, for a more complete description of the botanical resources found on the project site. The biogeographical status (native, alien, etc.) is given in the species list. Alien species which dominate most of the vegetation types are discussed in more detail in the vegetation description section of Appendix C.

Comment: *We question the findings of Freed's bird survey and there is no indication how many days were spent on-site to determine these findings.*

Response: Please refer to Volume III, Appendix D, which indicates that 23 hours were spent on the ground by Freed and an assistant and 2.5 hours were spent in a helicopter by Freed over a four-day period that included portions of January, March, July, and August.

Comment: *There should be a discussion of impacts to off-shore foraging areas for green and hawksbill turtles.*

Response: Much of the information is given in Volume III, Appendix E of the dEIS. The foraging habits of both species are discussed on page 33.

Hawaiian green turtles forage on a number of common algal species that occur in the subtidal and intertidal regions. The information on hawksbill foraging habits is

very sparse; they are known to feed on sponges. The dEIS discusses the distribution of some of the known favored algal forage species (for green turtles) in the waters fronting the project site. No statements are made about the availability of sponges as hawksbill forage because many of the Hawaiian sponges in coral reef habitats are very cryptic and tend to be very rare in high energy settings (as this one is). The hawksbill turtles are known to reside in the waters fronting the project site, however, so the assumption must be made that their forage is also present. It should be noted that hawksbill turtles held in captivity are very indiscriminate with respect to food items consumed; one such turtle observed by Dr. Brock for many years fed on a wide variety of plant and animal materials. It is conceivable that hawksbills in the wild are similarly opportunistic, feeding on wide range of materials.

Impacts of the development and operation of the launch facility at Palima Point on marine communities are discussed in the DEIS, Volume III, Appendix E on pages 48 through 53. Three points should be made:

* Insofar as green turtles are concerned, the preliminary analysis noted that most of the intertidal forage is found at locations from Kamehame Hill to the south at Punalu`u Bay (where the largest number of green turtles were seen during the survey). Thus, the forage for green turtles is more abundant on the southern portions of the project site (well away from the launch pads).

* The analysis concluded that the impacts to marine communities would be minimal to non-existent if the launch facility is constructed and operated.

* No sponges were recorded on the invertebrate survey made subtidally in the study. As stated by Dr. Brock, "This result is not surprising because of (a) the high energy nature of the habitats surveyed and (b) no survey work was carried out in caves where the opportunity to encounter sponges would be greater. We suspect that the hawksbill turtles offshore of Punalu`u Bay - Palima Point are feeding on a variety of fish, invertebrates and algae."

Comment: *We are concerned over impact of construction and rocket launch on Kamehame turtle nests. An analysis of the effects of construction vibrations, traffic, etc. is appropriate prior to any commitment to develop this area.*

Response: It should be noted that there are numerous examples of where vibration and noise are emitted into the nearshore marine environment with no discernible impact on marine species. The first example that comes to mind is during severe earthquakes; these have occurred from time immemorial and turtles continue to utilize Kamehame Hill beach for nesting activities. An example where the perturbation is from an anthropogenic source is at Keahole Point where the pumps for the 12-inch and 18-inch seawater pipes are emitting a loud sound almost continuously underwater. Consultants for this project have monitored fish and coral communities at Keahole Point since 1987 and have seen no discernible impact due to the noise.

Underwater construction--or merely the operation of certain vessels--creates relatively high noise levels and studies have not found an impact on sea turtles due to

noise or vibration. A case in point is the construction of four swimming lagoons at West Beach (Ko`Olina), Ewa, Oahu that occurred in 1989-1990. In that case, a large number (about 30) green sea turtles were located in a resting habitat about 1km from shore fronting the project site. The National Marine Fisheries Service was concerned that the construction of these lagoons along the shoreline using dynamite and heavy machinery (including a specially built bulldozer that worked via remote control underwater) would have a negative impact on the green turtle resting and foraging areas. The situation was monitored with NMFS personnel through the entire project. What occurred was totally unexpected--within two weeks from commencement of the lagoon construction, all but three turtles moved from the offshore resting area to a point about 200 m seaward and directly offshore of the actual construction site. None of the scientists involved in this study were able to explain why the turtles moved into close proximity of the construction work. Apparently in this case, the noise (including dynamite explosions) did not disturb the turtles.

Comment: *We are concerned over debris from errant rockets raining onto Kamehame Beach. The statement '. . . will have to be mitigated with FWS and NMFS' is vague. It is unclear how these agencies mitigate rocket debris rain and the potential impact of these activities on the budgets of these agencies.*

Figures V-3.5 and 3.8: Maps indicate debris fallout over a part of the park under certain conditions. A clearer explanation of this needs to be made and the concomitant mitigation measures. In a prior statement in this DEIS, there was assurance that any debris would fall only into the PCZ. The maps included in the document contradict this statement.

Response: Part of the basic design of the range safety system is to have a means of determining whether a vehicle is failing, a measure of the spread of the debris if the vehicle is destroyed, and a means of terminating the launch in such a way as to minimize risk to people and property. The PCZ (Population Control Zone) is an area with access restricted to only those involved with the operation of the spaceport or those that are there at the invitation of the spaceport. Inside the PCZ is an Impact Limit Line (ILL) that further restricts access on the spaceport. Those inside the Impact Limit Line are only those that are there to support the launch. Flight safety procedures are normally designed such that the risk to anyone outside the Impact Limit Line is less then one in a million and this would be the case for the Hawaiian Spaceport.

The Range Safety System will be used to stop a vehicle before its debris has a potential for impacting outside the Impact Limit Line. The Range Safety System has a display portion which includes a presentation of the Instantaneous Impact Point (IIP), a debris pattern and the destruct criteria. The destruct criteria will either consist of (1) a destruct line which, when crossed by the IIP, justifies transmission of the destruct command or (2) the impact limit line, which when crossed by the debris footprint justifies the transmission of the destruct command. In either case debris is not allowed to cross the impact limit line. The impact limit lines and the destruct criteria are developed when the facility and mission design are more mature, thus were not developed for this dEIS. They will be prepared when a precise mission is defined.

Some of the debris patterns shown in the dEIS indicate that debris may land on the shore and further inland. These patterns were prepared for different sets of wind conditions intended to describe the variety of non-storm meteorological conditions expected at the spaceport. If, at the time of launch, a debris pattern is expected to fall on land and violate an Impact Limit Line (i.e. there is an indication that the debris will present a risk to any person or facility on land) this becomes a reason for stopping the launch until the wind conditions change and the debris pattern doesn't violate an Impact Limit Line.

In summary, debris will be contained within Impact Limit Lines which will be inside the PCZ. If there is indication that debris could impact outside of the Impact Limit Lines because of wind conditions, the launch will be held. These actions should not impose any burden upon FWS and NMFS. There may be some discussion as to what is to be protected other than people and this would be incorporated into the launch hold criteria. There will also certainly be discussion as to levels of acceptable risk. We would propose that the levels be consistent with those used at the U.S. National Ranges. Their operations have resulted in no injuries or fatalities to off-site populations over a forty year period of operation.

We would expect that costs to NMFS and FWS would be those in reviewing proposed destruct limit lines. It is expected that protection of Kamehame beach would be an important criterion in determining the location of the destruct limit lines. We cannot imagine that review of this material would entail much cost.

Comment: *We are not satisfied that HAZMAT teams could protect park resources and personnel from transportation spills.*

Response: Please refer to the attached discussion by Dr. Alvin Greenberg on this issue (Attachment A).

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attachments

TRANSPORTATION SPILLS RISK ANALYSIS FOR HAWAII VOLCANOES NATIONAL PARK

Prepared by Dr Alvin Greenberg, Risk Science Associates

Typically, only a single chemical is involved in an accidental spill thereby minimizing the likelihood of an explosive reaction. This assumption is made in the toxic spills hazard analysis of the dEIS. 55-Gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (page 3-2 of Appendix A of Volume VI prepared by ACTA and page 5-54 of Volume I). According to ACTA, "the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test." ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than 1 drum or 1 cylinder per truck accident is considered to be unlikely. Nevertheless, hazards resulting from a worst plausible case transportation spill scenario were quantified in the DEIS.

Mitigation measures proposed and incorporated in the transportation spill scenario analyzed in the DEIS include a HAZMAT team accompanying all shipments with a 15-minute blanketing time representing the mitigating effect of the accompanying HAZMAT team. Extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment.

The highest 60-minute average concentrations of hydrazine predicted to occur at a distance of 20 m (66 feet, the closest distance modeled) from the spill, assuming a 15-minute blanketing time, would be 24.9 ppm during daytime conditions and 4.2 ppm during nighttime conditions. Likewise, the highest concentration of nitrogen tetroxide would be 549.4 ppm during daytime conditions and 225.1 ppm during nighttime conditions.

Under the conditions reported above, short-term cancer risk due to one hydrazine spill resulting from a transportation accident under daytime conditions is 6.5 in 100,000 and 1.1 in 100,000 under nighttime conditions. Noncancer hazard analysis indicates a maximum hazard index of 200 for hydrazine at a distance of 20 m under daytime conditions and 34 at that distance under nighttime conditions. The maximum hazard index for nitrogen tetroxide at a distance of 20 m under daytime conditions is 380 and under nighttime conditions it is 160.

A hazard index of less than one is considered to be a nonsignificant risk. A hazard index of greater than one indicates that some members of the population may experience adverse effects ranging from mild respiratory irritation to an exacerbation of a preexisting condition (e.g., asthma or emphysema). At exposures where the hazard index exceeds 100, more severe effects such as pulmonary edema could possible occur in the exposed population.

On page 7-44 of Volume II of the dEIS, it is stated that "The results of the noncancer hazard analysis indicate that persons within 20 m (66 feet) of a spill of hydrazine or nitrogen tetroxide under unfavorable weather conditions could suffer severe adverse health effects, even if the HAZMAT team following the transportation truck is able to cordon off the spill area, contain the spilled product, and either cover the spill or remove it." These effects could include respiratory and eye irritation, possible central nervous system toxicity, convulsions, pulmonary edema, and liver damage for short-term exposures at 25 ppm hydrazine and respiratory and eye irritation and minor liver toxicity for exposures at 4 ppm (Comstock et al. 1954; Jacobson et al. 1955). For nitrogen dioxide, short-term exposures at 6-40 ppm for 5 minutes, 7-17 ppm for 10 minutes, or 0.7-5 ppm for 15-40 minutes may result in increased airway resistance (NRC 1985a).

Exposure effects are summarized in Tables 1 and 2 of the response to this comment. This analysis applies to anyone who happens to be within 20 m of a spill including park employees, park visitors, etc. It is also important to note that the airborne concentration of hydrazine resulting from a transportation accident and subsequent spill would fall below the SPEGL of 0.12 ppm at a distance of 600-700 m (about 2,000-2,300 feet) from the spill. The airborne concentration of nitrogen tetroxide would fall below its SPEGL of 1.0 ppm at a distance of 900 m (about 3,300 feet) and that the IDLH for this substance (50 ppm) would be exceeded at distances up to 100 m (330 feet) from the spill site (page 7-44 of Volume II of the DEIS).

Thus, if park visitors happen to be within the distances given above of a transportation spill when it occurs, and if they remain at that distance during the 15-minute blanketing time rather than try to escape the area at the first indication or warning that an accident occurred, they may experience the effects outlined above. The dEIS recognizes the need for further study with respect to transportation risks, as noted on page S-16 and 1-5 of Volume I

Table 1. Hydrazine Toxicity

Level mg/m^3	Level ppm	No. of times greater than REL†	Toxicity
0.16	0.12	1.0	resp. irritation; minor liver toxicity
5.2	4	33	resp. and eye irritation odor threshold; minor liver toxicity
32.5	25	208	all of the above plus possible CNS toxicity, convulsions and pulmonary edema and liver damage
65	50	412	all of the above plus liver damage
104	80	666	IDLH; all of the above plus possibility of serious liver and kidney damage and death

†REL for hydrazine = 0.12 ppm

Table 2. N_2O_4 Toxicity

Level mg/m^3	Level ppm	Time min	No. of times greater than REL†	Toxicity
2.8	1.5	45	1.5	during exercise; increased airway resistance
1.3-3.8	0.7-2	20	0.7-2	increased airway resistance
3.0-3.8	1.6-2	15	1.6-2	increased airway resistance
5.6	3	45	3	increased airway resistance
9.4	5	15	5	increased airway resistance
7.5-9.4	4-5	15	4-5	decreased pulmonary diffusing capacity
7.5-9.4	4-5	40	4-5	increased airway resistance
13.2-32	7-17	10	7-17	increased airway resistance
11.3-75.2	6-40	5	6-40	increased airway resistance
94	50	---	50	IDLH
470	250	4.7	250	diffuse pneumonitis at 24 hr, clearing in 5 days (astronauts)

†REL for N_2O_4 = 1.0 ppm

LIGHT POLLUTION ANALYSIS
Prepared by Robert Baxter, CCM,
Engineering-Science, Inc
in association with Dr. Roy Garstang, Ph.D.,
University of Colorado (Emeritus)

The conclusion that the average tourist would probably not be affected significantly by the additional light due to the spaceport as viewed from the Kuee Ruins was based on Garstang observations that the increase in light looking straight up (a zenith angle of 0°) would not be very different from that predicted for and observed from the Kitt Peak National Observatory. This observatory, like the region around the Kuee Ruins, is a very dark site and at the observatory it is very hard to detect any light pollution, even with very sensitive instruments. Garstang has performed extensive modeling of the Kitt Peak Observatory site and has found that the measured light is even lower than his model predicts. This is thought to be the effect of stringent lighting control ordinances, similar to those on the Big Island, which have led to a reduction of the upward light from poorly shielded lighting fixtures.

At large zenith angles (e.g. 75° as calculated in the original report) the increase in man-made light would of course be greater. Looking at this angle would only be 15° above the horizon. Garstang's original calculations suggested an increase of 0.376 mag/sec^2 for the contribution of Palima Point. This would be considered a significant increase for professional astronomical purposes and deserves further consideration to determine if it would be significant for tourists visiting the Kuee Ruins.

Further analyses were performed by Garstang of his original findings comparing the results to a previous study performed by the National Park Service (NPS) at Bryce Canyon National Park (Carr et al., 1989). In the NPS study, visual thresholds estimating the general public's perception of the night sky and the glow dome associated with artificial light were determined using tourists visiting the park. The study results established measured values associated with "barely perceptible" and "perceptible" thresholds in detecting the presence of the sky glow. The report suggested values of 4 x 10^{-4} lumens/m^2/steradian for "barely perceptible" and 6 x 10^{-4} lumens/m^2/steradian for "perceptible". It can be shown that the following are the equivalent values that can be used to convert the Garstang reported values into equivalent units for comparison to the NPS reported thresholds.

Tourist perception of light	lumens/m^2/steradian	Photons in V band/ cm^2/sec/steradian
Barely perceptible	4×10^{-4}	1.6×10^{8}
Perceptible	6×10^{-4}	2.5×10^{8}

In the original Table 3 of the Garstang report the total sky brightness in the direction of Palima Point was predicted as 157,000 in units of 10^3 photons/cm^2/sec/steradian. This is equivalent to 1.57×10^8 photons/cm^2/sec/steradian and is very close to the figure 1.6×10^8 for "barely perceptible". Therefore, the original calculations predict that at a zenith angle of about 75° (15° above the horizon), the effect of Palima Point, including the natural background and surrounding cities, would be "barely perceptible". As one would look closer to the horizon, i.e. more directly toward Palima Point, the sky would become brighter. While no calculations were performed for larger zenith angles, one might guess that the effects would become "perceptible" at a zenith angle of about 80°. These results define a very small portion of the nighttime sky affected by the proposed spaceport that would be perceptible by tourists.

With regard to the verification of Garstang's model, he has published two principal papers (*Pub. Astron. Soc. Pacific*, ***98***, *364, 1986;* ***101***, *306, 1989*) dealing with the development of the models and applications to various observatories. Comparisons of the models have been made with observed sky brightnesses. The primary work has been with M. F. Walker at the University of California at Santa Cruz. Walker's observations were used to help calibrate two parameters in the models; the city luminosity of 1,000 lumens per head, and the fraction 10% of light escaping upwards. In addition to the Walker comparisons there have been many other comparisons between calculations and observations that have given confidence in the validity of Garstang's models for predictive purposes. An examination of the comparisons suggests that the predictions may be too bright, which gives a margin of safety when looking at prospective observatory sites as well as the analyses performed for light associated with the proposed spaceport.

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T. DAVID WOO, JR.

The Senate
The Seventeenth Legislature
of the
State of Hawaii

STATE CAPITOL
HONOLULU, HAWAII 96813

November 22, 1993

The Honorable John Waihee
State of Hawaii
c/o The Office of Environmental
Quality Control
220 South King St.
Honolulu, HI 96813

Dear Governor Waihee:

I am writing to voice my opposition to the Draft Environmental Impact Statement for the commercial satellite launching facility at Palima Point in Ka'u, Hawaii.

I have grave reservations about this project that stem from inherent flaws in the EIS process, which range from how the report contract was awarded to the data used to support its findings. In addition, I rely on the comments from our local scientific community that assert the draft report fails to address the enormity of the natural hazards at Palima Point as well as its use of old and inaccurate marine life data. For example, it is unbelievable that this report projects that a launch facility will have negligible impact on the hawksbill turtle population inhabiting nearby waters. Along those lines, I am bothered by the inadequate plans for compensation by the project owners for natural habitat lost to development. It is also my understanding that the atmospheric conditions caused by launches from the area will compromise viewing from our Mauna Kea observatory and that radar tracking devices necessary for a launch facility will disrupt the operation of radio telescopes currently in use at the observatory.

I disagree that a launch facility will be of economic benefit to the Ka'u community and the draft EIS fails to convince me otherwise. There is little evidence that the workforce in Ka'u will be able to compete for a majority of the jobs created by the spaceport project and the State has refused to provide enhanced educational opportunities over the past seven years which might have created a pool of

qualified applicants. The space industry is an inherently difficult and expensive one in which to compete, let alone prosper. This is evident by our own experience here in Hawaii where developers for this idea are nonexistent. The withdrawal of Lockheed International from the project sends an unmistakable message from the marketplace -- there is no industry interest in this project.

I am also deeply troubled by the possibility that nuclear material may be used at or launched from the site. Although a state statute is in place prohibiting such use, the Attorney General has made it clear that we cannot enforce that provision against the federal government.

Finally, it is the community outcry regarding this project that most moves me to oppose it. Simply put, most of the residents of Ka'u do not want the facility. They do not believe that the limited economic benefits from this venture outweigh the many crimes against nature and their way of life that will transpire in its construction and operation.

I implore the State to heed these messages and to occupy its time on more productive projects. I believe the State can benefit from involvement in space related industries other than a rocket launching facility.

Very truly yours,

ANDREW LEVIN
Senator, Third District

AL: das

cc: Tak Yoshihara, Deputy Director
Department of Business Economic Development and Tourism

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

The Honorable Andrew Levin
Senator
The Senate
State Capitol
Honolulu, HI 96813

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Senator Levin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS

Sincerely,

Takeshi Yoshihara

Attachments

Dr. Richard Brock contributed to the following response.

Comment: *I have grave reservations about this project that stem from inherent flaws in the EIS process, which range from how the contract was awarded to the data used to support its findings.*

Response: The contract for the dEIS was legally awarded and coordinated with the Department of the Attorney General. Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The Health Risk Assessment conducted for this project (DEIS Volume VIII, Appendix A) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

All of the data used to support the findings of the dEIS are included in the various technical appendices. The data and assumptions are provided so that reviewers would be able to perform identical calculations and arrive at the same results. To the best of our knowledge all of the data provided is accurate. It is difficult to respond to the comment without an indication as to which data is presumed flawed.

Comment: *The draft report fails to address the enormity of the natural hazards at Palima Point.*

Response: The dEIS states the natural hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the proposed project were to proceed. Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire Island of Hawaii. Furthermore, as stated in Appendix IIIA (page 19), the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense

nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard, albeit without a formal, quantitative risk analysis, so that the appropriate decision-makers could decide whether to proceed or abandon the project.

We agree that the dEIS does not discuss the effects of severe storms on facilities. The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community.

Structures can be sited, engineered and designed to satisfy these needs. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms. The recent experience at Johnston Island is a case in point. The chemical incinerator and the stored chemicals remained intact, even though the island was hit by hurricane John.

The dEIS is based on a conceptual plan that does not foresee how facilities might be designed for a specific project. Even the facility locations and the facilities themselves are only one indication of what could be expected if a real project is developed. A discussion of the limitations of the DEIS and further work required is presented on page 1-5 of Volume I, which states:

> *"In many cases, the dEIS raises questions that cannot be answered with available data and/or project information...It is intended that these issues will be resolved in a supplemental EIS which will be prepared when an actual project is planned."*

While it is possible to build facilities to survive severe storms, they may be costly, which is a factor the launch vehicle organization will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is built, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge.

Comment: *The draft report uses old and inaccurate marine life data. For example, it is unbelievable that a launch facility would have a negligible impact on the hawksbill turtle population inhabiting the nearby waters.*

Response: The report did not utilize "old and inaccurate marine life data...". The field information presented in Appendix IIIE of the dEIS was collected specifically for the spaceport project. It covers a number of field surveys carried out from 1990 through 1993. Perhaps the individual(s) presenting testimony to the contrary may be referring to some literature that was not cited in the report. This literature amounts to six papers that have either only just gone to press or have just been published in

1994 thus were not available when the report was written. These papers are as follows:

1. Balazs, G.H., P. Craig, B.R. Winton & R.K. Miya. In press. Satellite telemetry of green turtles nesting at French Frigate Shoals, Hawaii, and Rose Atoll, American Samoa. Proc. 14th Annual Symp. Sea Turtle Biology and Conservation. 4p.

2. Balazs, G.H. W.C. Dudley, L.E. Hallacher, J.P. Coney & S.K. Koga. In press. Ecology and cultural significance of sea turtles at Punalu'u, Hawaii. Proc. 14th Ann. Symp. Sea Turtle Biology and Conservation. 4p.

3. Katahira, L.K., C.M. Forbes, A.H. Kikuta, G.H. Balazs, & M. Bingham. In press. Recent findings and management of hawksbill turtle nesting beaches in Hawaii. Proc. 14th Ann. Symp. Sea Turtle Biology and Conservation.

4. Balazs, G.H., R.K. Miya & M.A. Finn. 1994. Aspects of green turtles in their feeding, resting, and cleaning areas off Waikiki Beach. Proc. 13th Ann. Symp. Sea Turtle Biology and Conservation. NOAA Tech. Memorandum NMFS-SEFSC-341. pp.15-18.

5. Balazs, G.H. 1994. Homeward bound: satellite tracking of Hawaiian green turtles from nesting beaches to foraging pastures. Proc. 13th Ann. Symp. Sea Turtle Biology and Conservation. NOAA Tech. Memorandum NMFS-SEFSC-341. 4p.

6. Russell, D.J. and G.H. Balazs. 1994. Colonization by alien marine alga Hypnea musciformis (Wulfen) J. Ag. (Rhodophyta: Gigartinales) in the Hawaiian Islands and its utilization by the green turtle, Chelonia mydas L. Aquatic Bot. 47:53-60.

Please note that technically, the first three papers have not appeared as a publication that could be cited now; Dr. Brock has recently seen xerox copies of the galley proofs that were kindly loaned to him by Mr. Balazs. The information in these papers does not alter the conclusions he has drawn in his report.

Again, it should be noted that none of these papers were available at the time the marine biological report was written. However, if there is something else that the "local scientific community" is referring to as having been missed or otherwise makes the data and conclusions of the report obsolete, we would be most interested to hear more about it.

If the project were to proceed, a comprehensive monitoring program should be in place to insure that the integrity of air, ground and nearshore marine waters and communities are not compromised.

Comment: *I am bothered by the inadequate plans for compensation by the project owners for natural habitat lost to development.*

Response: We do not anticipate any natural habitat loss on the Palima Point site. The 1,000 to 1,200 acres proposed for development are located on lava and/or former sugar and grazing lands. It should be noted that over 9,200 acres of the proposed 10,400-acre Population Control Zone will remain in open space.

Proposed precautionary measures to protect environmental values, and human benefits therefrom, would be mandatory conditions of any permits issued for the project. Biological and water chemistry monitoring programs could be a condition of any governmental permit issued for the project if it were to proceed.

Comment: *Atmospheric conditions caused by launches from the area will compromise viewing from our Mauna Kea observatory and radar tracking devices necessary for a launch facility will disrupt the operation of radio telescopes currently in use at the observatory.*

Response: It is stressed that State policy will not allow the launch facility to compromise viewing at Mauna Kea observatory. An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis identified certain conditions where there is a relatively high probability of transport of a rocket plume into the field of view of the observatories. These conditions occurred during both south and east launch trajectories with the highest percentage of unfavorable wind directions occurring during an east launch. A copy of the report is attached.

The scope of the described analyses was limited to identifying the percentage of time favorable wind directions would be present. The wind direction analysis provides the first step in understanding the potential for favorable launch conditions. However, even with unfavorable wind directions, high wind speeds could produce adequate transport to clear the plume from the field of view within a short time. Further refinement of the analyses to include the wind speed and the correlation between winds at different altitudes is left to future tasks in the event the project moves forward.

The new results described in the attached report provide information not available during the preparation of the draft EIS. The analysis suggests that it may be possible to modify the mitigation to increase the probability of favorable launch windows without compromising astronomical observations. Specifically, it might be acceptable to replace the prohibition against launches when there is a southerly wind component with a stipulation that ..."there will be no launches when the wind would carry the plume above a specified elevation (e.g. 30 degrees) at any time, as view from the observatories." Also, the requirement that the plume be transported out of the field of view (sky above 15 degrees elevation) within two hours of launch might possibly be replaced with a requirement that ..."the plume must not be in the field of view for longer than two hours." This would mean that the two-hour clock would not necessarily have to start at launch.

Obscuration by plumes is a potentially serious problem for which the currently proposed mitigation (as stated in Chapter Five of the dEIS) is believed to be adequate. These mitigating measures will not be changed at the present time. In the event the project moves forward, however, and refined analysis--as mentioned above--is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH Institute for Astronomy (IfA) for approval.

Radio frequency interference is discussed in Chapter 5 of Volume I. As stated on page 5-145, "Management of radiated power level, sector blanking, sidelobe energy control, frequency coordination and reduction of out-of-band emissions will be implemented to reduce the potential for radio frequency interference to acceptable levels as specified by the International Astronomical Union for optical/IR telescopes (power density less than $2\mu W/m^2$) and as specified by the National Radio Astronomy Observatory for radio telescopes. Continuous coordination with UH IfA will be mandatory during the site planning and design phases of the spaceport. Actual measurements will be made of terrain blockage and instrument susceptibility in order to refine guidelines for the location and operation of range instrumentation systems."

Comment: *I disagree that a launch facility will be of economic benefit to the Ka'u community and the draft EIS fails to convince me otherwise. There is little evidence that the workforce in Ka`u will be able to compete for a majority of the jobs created by the spaceport project.*

Response: The launch facility would provide a considerable number of employment opportunities for Big Island and Ka`u residents. As discussed in Appendix IXA, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka`u.

The estimated 290 jobs for the local labor force would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages within the launch industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In the early 1970s, a number of people opposed building telescopes atop Mauna Kea. Many asserted that the telescopes would provide few jobs to Big Island residents since local residents would not be skilled enough to compete for these positions. As it has turned out, however, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy

also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents.

Experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels---not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy, universities, airports, hospitals, computer companies, etc. If the launch facility is built, it will also be true there.

Comment: *The State has refused to provide enhanced educational opportunities over the past seven years which might have created a pool of qualified applicants.*

Response: If the launch facility proceeds, the State plans to provide enhanced educational opportunities that would create a pool of qualified applicants for jobs at the facility, pending funding approval by the legislature. In the State Spaceport Management Plan (Appendix XE), one of the stated objectives is *job training for local residents to allow them opportunities to be employed at Spaceport.* The Plan also recommends that the State Authority require the launch companies to *establish and fund ongoing education and training programs for Hawaii residents with the goal of preparing them for administrative and technical jobs at Spaceport.*, and calls for representative(s) on the Board of Directors of the State Authority to have expertise in education and training.

Furthermore, there would be ample time (at least 4 years) to establish training programs to qualify workers for the initial jobs after a commitment was made to develop the launch facility. This period of time would be needed to obtain rights to the land, to obtain approvals and permits, and to design and build the facilities.

Comment: *The space industry is an inherently difficult and expensive one in which to compete, let alone prosper. This is evident by our own experience here in Hawaii where developers for this idea are nonexistent. The withdrawal of Lockheed International from the project sends an unmistakable message from the marketplace--there is no industry interest in this project.*

Response: Historically, successful economic development occurs within a context of comparative economic advantage. As explained in the Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii, February 1993, the principal comparative advantage offered by Hawaii is that a single launch facility can be used to place satellites into both equatorial and polar orbits. On the mainland, a new launch company must build and maintain two expensive launch facilities: one in Florida for equatorial launches, and one in California for polar launches.

This comparative economic advantage for Hawaii has attracted the interest of companies that wish to take advantage of recent advances in rocket-launching technology and have plans to place large "constellations" of communication satellites in low-earth orbit. These companies would be the likely market for a Hawaii launch facility. It

should be emphasized, however, that the military already has extensive infrastructure investment in the two national ranges and, therefore, does not require a facility that would allow both polar and equatorial launches from a single site.

The promotion of Hawaii's comparative economic advantages - combined with State and County assistance in securing the necessary development approvals - is the same approach that was used so successfully in attracting the astronomical telescopes to Mauna Kea. We agree, however, that the space industry is an inherently difficult and expensive one in which to compete.

The question of whether the commercial launch market is strong enough to support a new launch site in Hawaii is certainly valid. Estimates of the number of launches necessary to make the Hawaii spaceport economically viable range from 12 to 22 per year. This exceeds the number of available launches, according to some recent market projections. The commercial market is dynamic, however, and difficult to forecast as evidenced by recent proposals to launch over 850 communications satellites into low earth orbit.

The spaceport would be built by private industry, probably an international consortium, and not the state or federal government. Before private investment capital would be committed to such a project, the issue of economic viability and market would be thoroughly addressed by the consortium. Their analysis would be done in the context of a real project, not simply a conceptual plan. The spaceport would not be built if the private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired return on their money.

Comment: *I am deeply troubled by the possibility that nuclear material may be used at or launched from the site. Although a state statute is in place prohibiting such use, the Attorney General has made it clear that we cannot enforce that provision against the federal government.*

On January 31, 1991 the Attorney General of the State of Hawaii rendered an opinion on whether the federal government would be able to launch space vehicles from a State or civilian spaceport located in Hawaii during peacetime, without the consent of the State. The Attorney General concluded that "We believe that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, either directly or indirectly, during peacetime or wartime, and that as a result of such preemption, vehicles carrying payloads in violation of Act 172 could be launched from a spaceport located in Hawaii."

Response: Although it is possible that the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch

ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: *It is the community outcry regarding this project that most moves me to oppose it. Simply put, most of the residents of Ka`u do not want the facility. They do not believe the limited economic benefits from this venture outweigh the many crimes against nature and their way of life that will transpire in its construction and operation.*

Response: As stated in Volume II, Chapter Seven and in Appendix IXC, a resident survey indicated a strong preference for continuing existing life-styles. The qualities of Ka`u that respondents felt should be preserved included its life-style, open space and shoreline, historic and archaeological sites, and fishing and gathering grounds. These qualities must be carefully considered during all stages of the project, if developed. Although a spaceport would predispose Ka`u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the PCZ, the project area would be mostly open space.

Again, judgments about the costs and benefits are up to the relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well informed judgments. The state does not anticipate further active participation in the launch site initiative at this time. Development of the facility would only occur if driven by sufficient demand for commercial launch services and community support for the project.

attachments

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

JOHN WAIHEE
GOVERNOR

MAJOR GENERAL EDWARD V. RICHARDSON
DIRECTOR OF CIVIL DEFENSE

ROY C. PRICE, SR.
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 734-2161

November 30, 1993

TO: Governor, State of Hawaii
c/o Office of Environmental Quality Control

FROM: Roy C. Price, Sr.
Vice Director of Civil Defense

SUBJECT: STATE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS); CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

We appreciate this opportunity to comment on the State DEIS by the Department of Business, Economic Development and Tourism (DBEDT) on the Commercial Satellite Launching Facility at Palima Point, District of Ka'u, County of Hawaii, Island of Hawaii; TMK 4-06-2: portion 01-06; 09; 10; 20; 28; 42-49 and 9-6-13: Portions 03; 05; 06.

We do not have negative comments specifically directed at the State DEIS. However, there are other aspects of emergency preparedness and mitigation not specifically in the DEIS that need to be addressed. The natural hazards of volcanic, earthquake and tsunami are addressed. The impact of tropical cyclone/hurricane force winds and the triple threat of storm waves, high winds and heavy rainfall associated with these winds are not and require serious consideration and incorporation in the DEIS.

In Volume I, pages 5-54, paragraph I, Mitigating Measures, subparagraph 7, last sentence and paragraph J, Evacuation of Affected Areas, subparagraph 2, first "o" respectively, "Emergency and contingency . . ." and "A warning program should . . .", should include the State of Hawaii Civil Defense Division. Additionally, in Volume I, paragraph J, Evacuation of Affected Areas, subparagraph 2, first "o," the warning program should consider, among the options available, a siren/alerting system purchased and installed by the developer, along the prescribed route or mobile units with public address capability, procured by the developer, to notify persons to evacuate to a safe distance in the event of a serious accident. In all cases, the developer must provide educational programs about evacuation procedures.

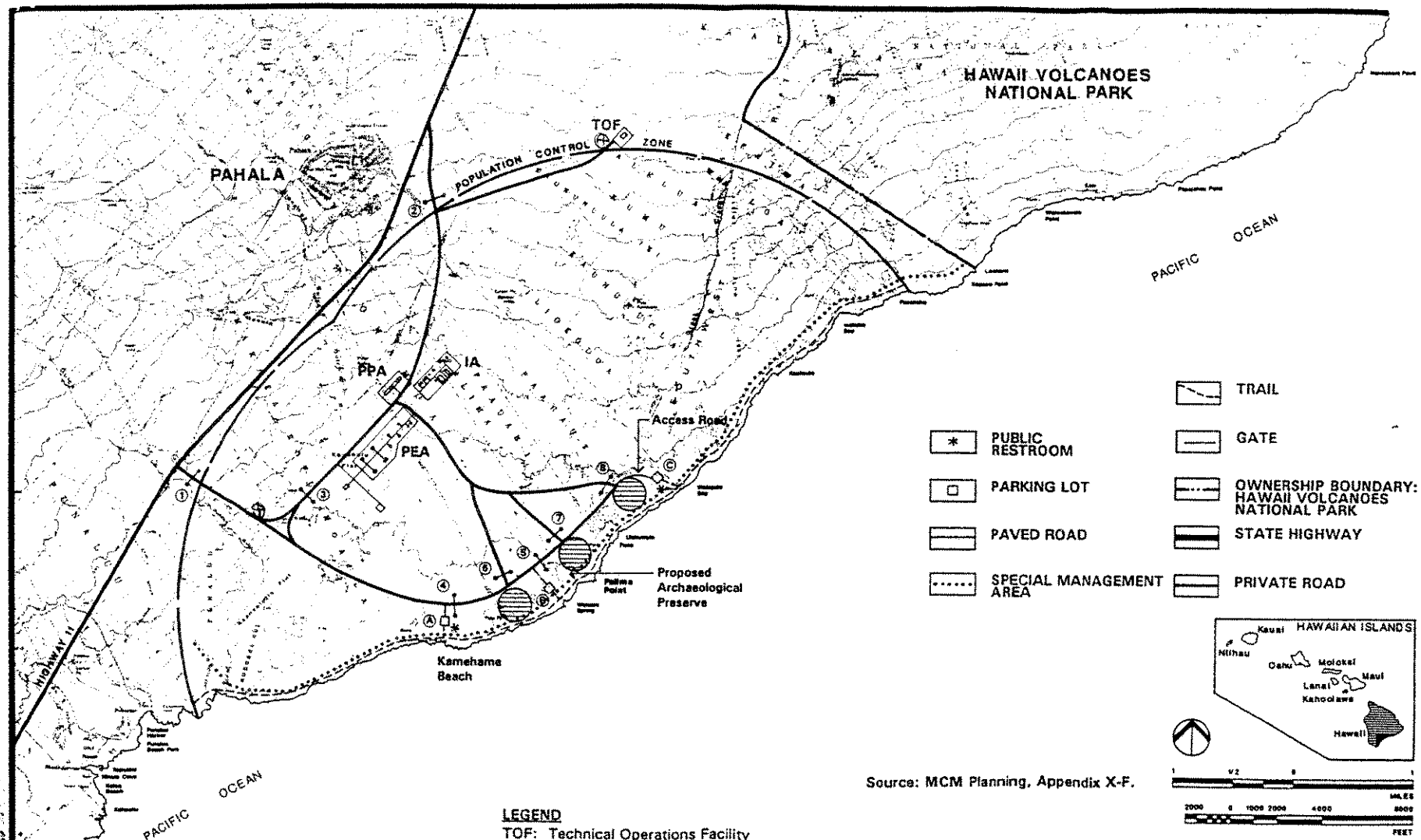
The proximity of the Pahala Hospital to the proposed project area dictates that the special mitigation attention/efforts should be provided because of the high noise levels that will be generated when launching the Atlas IIAS and Delta II boosters, as well as "explosive overpressure effects from an on-pad conflagration or deflagration." Any special evacuation requirements for the hospital should also be addressed as well.

The Commercial Satellite Launching Facility should also consider acquiring a minimum of at least two 121 DB warning/alerting devices to signal a launch. This will help minimize the "startle factor" addressed in Volume VII, page VII.8, paragraph E, Rocket Launch Noise, page VII.13, subparagraph 6, Rocket Noise Impact on Humans; and page VII.14, Rocket Noise Mitigation, page VII.18, subparagraph b. The location of these devices should be placed at the Technical Operations Facility and near gate/check point 3. Both locations are noted on the copy of Figure II-4.2 of the "Conceptual Shoreline Access Plan."

Our SCD planners and technicians are available to discuss this further, if there is a requirement. Please have your staff call Mr. Mel Nishihara of my staff at 734-2161.

Enc.

c: ✓Mr. Takeshi Yoshihara
Deputy Director, Department of
Business, Economic Development & Tourism



LEGEND
TOF: Technical Operations Facility
IA: Industrial Area
PPA: Payload Processing Area
PEA: Propellant and Explosives Area

Source: MCM Planning, Appendix X-F.

Figure II-4.2
CONCEPTUAL SHORELINE ACCESS PLAN

2-51

JOHN WAIHEE
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DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

MEMORANDUM

TO: The Honorable Roy C. Price, Sr.
Vice Director, Civil Defense Division
Department of Defense

FROM: Takeshi Yoshihara

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Thank you very much for your comments on the subject dEIS. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. If a specific project advances, a supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Attachments

ACTA Inc. contributed to the following response.

Comment: *The natural hazards of volcanic, earthquake and tsunami are addressed. The impact of tropical cyclone/hurricane force winds and the triple threat of storm waves, high winds and heavy rainfall associated with these winds are not and require serious consideration and incorporation in the DEIS.*

Response: Chapter Three of Volume I includes a brief description of the climate of Ka`u. On page 3-12, it states,

> *"Much of this rain falls during a few concentrated storms. The Ka`u District receives unusually heavy rains when winds turn southeasterly...flooding may occur..."*

We agree that the DEIS does not discuss the effects of severe wind storms on facilities. The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community.

Structures can be sited, engineered and designed to satisfy these needs. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms. Because of the high capital investment required to develop a launch facility, it is certain that all structures will be engineered to sustain maximum design winds.

The costs of designing for severe storms will be a factor the launch site developer will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is realized, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge. Some of the design and operational issues pertaining to tropical storm threats that need to be considered by a developer/operator are:

* Is there sufficient time at the first notice of a potential storm to protect a vehicle that is scheduled for launch and may be partially built-up?

* Can hazardous materials such as liquid propellants be stored in such a way as to survive a storm without the storage vessel being breached and allowing a potentially dangerous spill?

* How will solid rocket motors be protected during a storm?

It should be noted that the ability to successfully secure hazardous materials during a severe storm was recently tested at Johnston Island during hurricane John.

Comment: *In Volume I, pages 5-54, paragraph I, Mitigating Measures, subparagraph 7, last sentence and paragraph J, Evacuation of Affected Areas, subparagraph 2, first "o" respectively, "Emergency and contingency..." and "A warning program should...", should include the State of Hawaii Civil Defense Division. Additionally, in Volume I, paragraph J, Evacuation of Affected Areas, subparagraph 2, first "o," the warning program should consider, among the options available, a siren/alerting system purchased and installed by the developer, along the prescribed route or mobile units with public address capability, procured by the developer, to notify persons to evacuate to a safe distance in the event of a serious accident. In all cases, the developer must provide educational programs about evacuation procedures.*

Response: The reviewer raises excellent points and we concur with these suggestions. Modifications have been made to the appropriate paragraphs in the Final EIS.

Comment: *The proximity of Pahala Hospital to the proposed project area dictates that the special mitigation attention/efforts should be provided because of the high noise levels that will be generated when launching the Atlas IIAS and Delta II boosters, as well as "explosive overpressure effects from an on-pad conflagration or deflagration." Any special evacuation requirements for the hospital should be addressed as well.*

Response: Volume VII, Appendix F, page 30 contains mitigation measures for blast overpressure effects. Appendix B in Volume VII recommends an on-going program of obtaining frequent meteorological data and sound propagation testing to promote a better understanding of the local acoustic conditions. Because of the proximity of Punalu`u and Pahala, however, the only way to eliminate the potential for breakage possibilities would be to limit the vehicles to those with a lower TNT equivalency yield than those mentioned above. We do not anticipate any special evacuation requirements for the hospital at this time. Any evacuation requirements for a specific project, if one develops, will be addressed in subsequent environmental analyses.

Comment: *The Commercial Satellite Launching Facility should also consider acquiring a minimum of at least two 121 DB warning/alerting devices to signal a launch. This will help minimize the "startle factor" address in Volume VII, page VII.8, paragraph E, Rocket Launch Noise, page VII.13, subparagraph 6, Rocket Noise Impact on Humans; and page VII.14, Rocket Noise Mitigation, page VII.18, subparagraph b. The location of these devices should be place at the Technical Operations Facility and near gate/check point 3. Both locations are noted on the copy of Figure II-4.2 of the "Conceptual Shoreline Access Plan."*

Response: We agree that the facility should implement a warning system to signal a launch. Because the locations of the facilities have not been determined due to the conceptual nature of the project, we recommend that determination of the location(s) for the warning devices be deferred until an actual project is planned.

JOHN WAIHEE
GOVERNOR

'93 OCT -7 P1:40

OFC. OF ENV.
QUALITY CONT.

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 119, HONOLULU, HAWAII 96810

POSTED

ROBERT P. TAKUSHI
COMPTROLLER

LLOYD I. UNEBASAMI
DEPUTY COMPTROLLER

LETTER NO. (P)1714.3

OCT 6 1993

The Honorable John Waihee
Governor, State of Hawaii
c/o Office of Environmental
Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Governor Waihee:

Subject: Commercial Satellite Launching Facility
Palima Point, Kau, Hawaii
Draft EIS

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Public Works Division at 586-0488.

Respectfully,

Robert P Takushi

ROBERT P. TAKUSHI
State Comptroller

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

IN REPLY REFER TO:
93:PPE/5733

November 22, 1993

TO: Governor, State of Hawaii
c/o Office of Environmental Quality Control

FROM: Joseph K. Conant
Executive Director

SUBJECT: Draft EIS for the Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point

We have reviewed the housing analysis for the subject draft EIS and have no comments to offer.

Thank you for the opportunity to comment.

c: Mr. Tak Yoshihara, DBEDT

H F D C

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

MEMORANDUM

TO: The Honorable Peter A. Sybinsky
Director of Health
Department of Health

FROM: Takeshi Yoshihara

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Thank you very much for your comments on the subject dEIS. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. If a specific project advances, a supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Attachments

KRP Information Services and Risk Science Associates (RSA) contributed to the following responses. RSA prepared the risk analyses.

Comment: *Wastewater treatment and disposal has not been adequately addressed in the subject document. As there is no existing sewer service system in the area, the Department of Health (DOH) recommends the use of a private treatment works system to be constructed on the site. The treated effluent should be reused for irrigation wherever possible.*

Response: The dEIS was prepared for a conceptual plan, not an actual project. As noted in Volume I (pages 2-45 and 4-32), private sewage treatment facilities will be constructed. The exact number and location of sewerage treatment units will be determined upon the final configuration of the facilities. It is noted in the dEIS that the project is located in a critical wastewater disposal area. All wastewater plans will conform to applicable provisions of the DOH's Administrative Rules, Chapter 11-62, Wastewater Systems. The treated effluent will be reused for irrigation if possible.

Comment: *If new sources of potable water are developed, they must comply with Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems.*

Response: The dEIS indicates that potable water will be obtained from either the existing County water system or a private water system utilizing wells located in the project site. Any new source of potable water will comply with Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems.

Comment: *Because the project site is located above (mauka) the UIC line, activities that may impact underground sources of drinking water are regulated by various environmental agencies to prevent the contamination of groundwater, including drainage drywells.*

Response: As noted above in the response to the comment on wastewater, the location of the project site mauka of the UIC line is acknowledged in the dEIS. No injection wells are planned.

Comment: *The developer, owner and operator of the site who intends to treat, store, or dispose of hazardous waste are subject to RCRA section 3005, USC 6925, and 40 CFR Parts 264 and 270.*

Response: As noted in the Volume I of the dEIS (pp. 2-45, 4-32 and 4-33), the developer of the site will be required to manage hazardous materials and wastes in compliance with State and EPA rules and regulations.

Comment: *Should the proposed launch port involve the installation of underground storage tanks, they may be regulated in accordance with the technical standards and financial responsibility regulations of 40 CFR part 280 and State law. The installation of tank systems containing flammable and combustible liquids is also subject to regulation by the County of Hawaii Fire Department.*

Response: Should the developer of the site utilize underground storage tanks, they will be regulated in accordance with the technical standards and financial responsibility regulations of 40 CFR part 280 and State administrative rules on underground storage tanks to be promulgated under HRS Chapter 342L. The storage facilities will also meet applicable County of Hawaii Fire Department requirements.

Comment: *The project should incorporate a solid waste minimization and diversion plan before construction of the facility and utilize recycled materials wherever possible.*

Response: The developer of the site will be required to incorporate a solid waste minimization and diversion plan before construction of the facility, in accordance with the requirements of the State of Hawaii Integrated Solid Waste Management Act. Secondary resources recycled materials will be used in the construction of the facility whenever feasible, including locally produced compost, if available, for landscaping purposes, and plastic lumber, if available, as an alternative building material. Glasphalt, if available, will be used to the extent possible in the construction of facility parking lots.

Comment: *What would the risk estimates be if the assumptions were changed to 15 kg children ingesting soil at a rate of 100 mg/day?*

Response: Thank you for your compliment on the HRA. In respond to your specific comment, the soil ingestion pathway only applies to exposure to deposited aluminum oxide from the following scenarios: normal launch, on-pad conflagration, and ascent conflagration. Aluminum oxide is not a carcinogenic substance; the risk assessment in the dEIS (Volume VIII, Appendix A) evaluates the chronic hazard index due to soil ingestion exposure.

Your comment correctly points out that soil ingestion is estimated at 200 mg/day for children aged 1-6 weighing an average of 15 kg and that the soil ingestion rate for the remainder of the 70 year lifetime is 100 mg/day. Although the question at the end of the comment asks what the risk estimates would be if the assumptions were changed to 15 kg children ingesting 100 mg/day--not the 200 mg/day usually assumed for children--it is assumed that the reviewer meant...*what would it do to the risk estimates if the assumptions were changed to 15 kg children ingesting 200 milligrams per day?*

The assumptions used for the soil ingestion pathway in the health risk assessment (HRA) were for 70 kg adults ingesting soil at a rate of 100 mg/day for an exposure duration of 70 years. The assumptions used for the reevaluation of the soil ingestion pathway in this response are for 1-6 year old children weighing an average of 15 kg and ingesting soil at a rate of 200 mg/day for 6 years. After this period, it is assumed

that the average body weight is 70 kg and the soil ingestion rate is 100 mg/day for the remaining 64 years of the 70 year lifetime. The attached revised Tables 4-1 and 4-2 (revisions of tables in Volume VIII, Appendix A of the dEIS) list the assumptions used in following the analyses of the normal launch scenario and the accident scenario, respectively.

In the normal launch scenario, chronic soil ingestion dose due to release of aluminum oxide is recalculated in the attached revised Table 7-10 (see Volume VIII, Appendix A of the dEIS). The maximum dose occurs at Punalu`u Condos under Kona (worst case) scenario and is 9.3 x 10^{-2}mg/kg/day. The dose estimated in the HRA was 5.43 x 10^{-2}mg/kg/day. Revised Tables 7-13 and 7-14 (attached) give the chronic hazard index due to release of aluminum oxide and due to the release of hydrogen chloride and aluminum oxide, respectively. The maximum hazard index values are: 0.766 (aluminum oxide only) and 0.827 (HCl and aluminum oxide). In the HRA, the maximum hazard index values were: 0.490 and 0.537, respectively. While assuming a higher soil ingestion rate for a child for an exposure duration of 6 years results in a higher chronic hazard index for aluminum oxide under the normal launch scenario, the values obtained are still less than one and thus represent no hazard.

In the on-pad vehicle conflagration scenario, chronic soil ingestion dose due to release of aluminum oxide is recalculated (attached Table 8-9). The maximum dose occurs at Oceanview Estates School, 9 SRBs burning and is 2.51 x 10^{-5}mg/kg/day. The dose estimated in the HRA was 1.46 x 10^{-5}mg/kg/day. Revised Tables 8-12 and 8-13 give the chronic hazard index due to release of aluminum oxide and due to the release of hydrogen chloride and aluminum oxide, respectively. The maximum hazard index values are: 2.07 x 10^{-4} (aluminum oxide only) and 2.32 x 10^{-4} (HCl and aluminum oxide). In the HRA, the maximum hazard index values were: 1.32 x 10^{-4} and 1.57 x 10^{-4}, respectively. While assuming a higher soil ingestion rate for a child for an exposure duration of 6 years results in a higher chronic hazard index for aluminum oxide under the on-pad vehicle conflagration scenario, the values obtained are still considerably less than one and thus represent no hazard.

In the ascending vehicle conflagration scenario, chronic soil ingestion dose due to release of aluminum oxide is recalculated (Revised Table 8-26). The maximum dose occurs at Pahala Preschool and Ka`u Hospital at 10 seconds after lift-off and is 1.89 x 10^{-4}mg/kg/day. The dose estimated in the HRA was 1.11 x 10^{-4}mg/kg/day. Revised Tables 8-28 and 8-29 give the chronic hazard index due to release of hydrogen chloride and aluminum oxide due to conflagration of a vehicle in ascent at 5 and 10 seconds after lift-off, respectively. The maximum hazard index values are: 1.66 x 10^{-3} (5 sec after lift-off and 2.43 x 10^{-3} (10 sec after lift-off). In the HRA, the maximum hazard index values were: 1.09 x 10^{-3} and 1.87 x 10^{-3}, respectively. While assuming a higher soil ingestion rate for a child for an exposure duration of 6 years results in a higher chronic hazard index for aluminum oxide under the ascending vehicle conflagration scenario, the values obtained are still considerably less than one and thus represent no hazard.

Comment: *How were the unit risks for UDMH and FDH derived?*

Response: The source for the inhalation unit risk for UDMH used in the HRA is:

> California Air Pollution Control Officers Association (CAPCOA). January 1992. Air Toxics "Hot Spots" Program Risk Assessment Guidelines. Prepared by the AB2588 Risk Assessment Committee of the California Air Pollution Control Officers Association.

This document was subsequently revised in 1993 and the same preliminary cancer unit risk value for UDMH is listed. The 1992 and 1993 CAPCOA documents reference the following report as the basis for the inhalation unit risk for UDMH:

> Goldenthal, E.I. 1989. Two Year Oncogenicity Study in Rats, Unsymmetrical Dimethylhydrazine. International Research and Development Corporation, Mattawan, MI.

The rationale behind using the same unit risk for FDH as that used for UDMH is given on page A-26 of the HRA (DEIS Volume VIII, Appendix A). Toxicological information on FDH, a decay product of UDMH decomposition, was not available. Thus, in the absence of toxicological information specific to FDH, it was assumed in the HRA that the toxicological properties and acceptable exposure levels of FDH are equivalent to the properties and levels of its parent compound, UDMH.

During preparation of the response to this comment, however, RSA discovered an error in their cancer risk calculations for UDMH and FDH during deflagration. The inhalation unit risk factor for UDMH and FDH used in the HRA was 4.9×10^{-7} $(\mu g/m^3)^{-1}$, while the CAPCOA document (1992 and 1993) lists a screening unit risk for UDMH of 4.9×10^{-4} $(\mu g/m^3)^{-1}$, a factor of 1000 higher than the value used in the assessment. RSA has no explanation for this error except that it was most likely a typographical error made early in the preparation of the risk assessment that was unfortunately carried through. Corrected inhalation unit risk and inhalation potency values for UDMH and FDH are listed in the attached Revised Table 5-1.

Release of UDMH and FDH can occur during a deflagration event. Cancer risk due to the release of UDMH during deflagration is presented in Table 8-52 of the HRA. Using the correct inhalation unit risk for UDMH results in a maximum cancer risk at Pahala Preschool and Ka`u Hospital under Nocturnal Drainage scenario of $3.72 \times 10^{-8}$ compared to the cancer risk of $3.72 \times 10^{-11}$ reported in the HRA (see attached Revised Table 8-52). Likewise, using the correct inhalation unit risk for FDH results in a maximum cancer risk at Pahala Preschool and Ka`u Hospital under Nocturnal Drainage scenario of 2.98×10^{-10} compared to the cancer risk of 2.98×10^{-13} reported in the HRA (see attached Revised Table 8-53). The overall inhalation cancer risk due to release of hydrazine, UDMH, FDH, and DMNA during a deflagration episode becomes 4.35×10^{-7} (see attached Revised Table 8-55) compared to 3.97×10^{-7} reported in Table 8-55 of the HRA. Cancer risk resulting from cumulative impacts of conflagration and deflagration at Pahala, Na`alehu, and Captain Cook using the correct inhalation unit risk for UDMH are 4.3×10^{-7}, 1.5×10^{-7}, and 2.5×10^{-8}, respectively (see attached Revised Table 8-69). The risks reported in the HRA are: 4.0×10^{-7}, 1.4×10^{-7}, and 2.1×10^{-8}.

Corrected cancer risk due to release of UDMH by an accidental spill of 615 gallons of UDMH from a vehicle fuel tank is given in attached Revised Table 9-16. The corrected value is 9.5×10^{-5} compared to the value reported in the HRA of 9.5×10^{-8} (Table 9-16 of the HRA).

Although this error reflects a 1000-fold increase in cancer risk due to exposure to UDMH and FDH during deflagration, the cumulative impacts due to conflagration and deflagration involving hydrazine, UDMH, FDH, and DMNA are only changed by less than 10% at Pahala and Na`alehu. Risk due to a 615-gallon spill of UDMH of 9.5×10^{-5} represents a greater increase, putting this scenario closer to the range of magnitude of risk due to a spill of hydrazine which is 9.5×10^{-4}.

The foregoing risk assessments for spills of 615 gallons of UDMH are somewhat artificial in that the largest quantity of UDMH in a single vessel would be the Delta II second stage, which carries 615 gallons of Aerozine 50 (a 1:1 blend of hydrazine and UDMH). In addition, the risk assessment results do not account for passive or active containment measures that are expected to be implemented if a launch project is developed. It should be noted that many launch vehicles do not use hypergolic propellants at all, therefore, it is possible that none would be used at Palima, except for small quantities necessary for the payloads.

attachments

Revised Table 4-1. LIST OF ASSUMPTIONS USED IN THE ANALYSIS OF THE NORMAL LAUNCH SCENARIO.

Pathway	Parameter	Variable	Value	Units
All				
	Average body weight of an adult	BW_adult	70	kg
	Exposure duration as an adult	ED_adult	64	years
	Lifetime exposure duration	ED	70	years
	Average body weight of a child age 1-6	BW_child	15	kg
	Exposure duration of a child age 1-6	ED_child	6	years
	Averaging time (ED*365 days/yr)	AT	25550	days
Inhalation				
	Respiration rate	IR	20	m3/Days
	Exposure frequency	EF_inh	20	hours/year
Soil Ingestion				
	Deposition duration (20 hours/year)	CD	0.002	
	Soil elimination constant	ke	6.93E-06	days
	Soil mixing depth	SD	0.01	m
	Soil bulk density	BD	1333	kg/m3
	Total days of exposure period	T1	25550	Days
	Beginning of exposure period	To	0	Days
	Deposition velocity	Vdep	0.05	m/sec
	Ingestion Rate	IR_soil_adult	100	mg/day
	Ingestion Rate	IR_soil_child	200	mg/day
	Fraction ingested from contaminated source	FI	1	
	Exposure frequency	EF_ing	365	days/year
Dermal Absorption				
	Surface area of exposed skin	SA	5820	cm2
	Soil to skin adherence factor	AF	2.77	mg/cm2
	Absorption factor	ABS	0.001	
	Exposure frequency	EF_derm	365	days/year
Surface Water Ingestion				
	Ingestion rate	IR_water	2	l/day
	Exposure frequency	EF_ing_water	365	days/year

Revised Table 4-2. LIST OF ASSUMPTIONS USED IN THE ANALYSIS OF THE ACCIDENT SCENARIO.

Pathway	Parameter	Variable	Value	Units
All	Average body weight of an adult	BW_adult	70	kg
	Exposure duration as an adult	ED_adult	64	years
	Lifetime exposure duration	ED	70	years
	Average body weight of a child age 1-6	BW_child	15	kg
	Exposure duration of a child age 1-6	ED_child	6	years
	Averaging time (ED*365 days/yr)	AT	25550	days
Inhalation				
	Respiration rate	IR	20	m3/Days
	Exposure frequency	EF_inh	0.01	hours/year
Soil Ingestion				
	Deposition duration (1 hour/lifetime)	CD	1.83E-04	
	Soil elimination constant	ke	6.93E-06	days
	Soil mixing depth	SD	0.01	m
	Soil bulk density	BD	1333	kg/m3
	Total days of exposure period	T1	25550	Days
	Beginning of exposure period	To	0	Days
	Deposition velocity	Vdep	0.05	m/sec
	Ingestion Rate	IR_soil_adult	100	mg/day
	Ingestion Rate	IR_soil_child	200	mg/day
	Fraction ingested from contaminated source	FI	1	
	Exposure frequency	EF_ing	365	days/year
Dermal Absorption				
	Surface area of exposed skin	SA	5820	cm2
	Soil to skin adherence factor	AF	2.77	mg/cm2
	Absorption factor	ABS	0.001	
	Exposure frequency	EF_derm	365	days/year
Surface Water Ingestion				
	Ingestion rate	IR_water	2	l/day
	Exposure frequency	EF_ing_water	365	days/year

Revised Table 7-10. CHRONIC SOIL INGESTION DOSE DUE TO RELEASE OF ALUMINUM OXIDE DURING A NORMAL LAUNCH
(IN mg/kg/day Al2O3)

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE: KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTDN
1	Aloha Montessori Preschool	58	4.10E-02	4.10E-02	4.10E-02	4.10E-02	4.10E-02	4.10E-02	4.10E-02	4.10E-02
2	Creative Day Preschool Inc.	137	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03
3	Keauhou Day Care - Kona	132	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03
4	Head Start Kailua	134	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03
5	Head Start Ka'u Home Base	58	4.04E-02	4.04E-02	4.04E-02	4.04E-02	4.04E-02	4.04E-02	4.04E-02	4.04E-02
6	Kamehameha Schools	128	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03
7	Kona Baptist Kaikilani	131	3.59E-03	3.59E-03	3.59E-03	3.59E-03	3.59E-03	3.59E-03	3.59E-03	3.59E-03
8	Kona Hongwanji Preschool	129	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03
9	Mokuaikaua Church Nursery School	134	2.75E-03	2.75E-03	2.75E-03	2.75E-03	2.75E-03	2.75E-03	2.75E-03	2.75E-03
10	Pahala Preschool	143	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02
11	Pal Uli Waldorf School	128	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03
12	Salvation Army Ohana Keiki Day Care Center	134	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03	2.79E-03
13	University of the Nations	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
14	Sherry Alves	128	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03
15	Maija Abeyta	136	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03
16	Tiina Akaoni	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
17	Joann Bisher	128	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03
18	Dawn Bradford	137	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03
19	Keiki Corner	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
20	Lucy Delarios	136	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03
21	Cammy Featherstone	133	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
22	Nancy Fujimoto	133	3.17E-03	3.17E-03	3.17E-03	3.17E-03	3.17E-03	3.17E-03	3.17E-03	3.17E-03
23	Pat Gibson	138	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03
24	Chris Hagerman	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
25	Kathy Leasasa Hanlon	136	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03
26	Sandra Hanson	138	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03	2.56E-03
27	Debbie Hedemann	128	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03	4.47E-03
28	Linda Hester	136	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03	2.70E-03
29	Mema Kin In	136	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03
30	S.J. Lemnah	137	2.33E-03	2.33E-03	2.33E-03	2.33E-03	2.33E-03	2.33E-03	2.33E-03	2.33E-03
31	Kristen Leoma	130	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03
32	Barbara Legg	138	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03
33	Gail McLeod	136	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03	2.24E-03
34	Lydia Pope	138	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03
35	Irma Ritmeester	137	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03
36	Debbie Sams	138	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03	2.42E-03
37	Jill Terwilliger	134	2.93E-03	2.93E-03	2.93E-03	2.93E-03	2.93E-03	2.93E-03	2.93E-03	2.93E-03
38	Alise Vegas	139	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03	2.37E-03
39	Loran Victorino	128	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03
40	Angela Walton	135	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
41	Jodi Walton	142	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03	2.28E-03
42	Patti Yamashita	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
43	Hawaii Preparatory Academy, Kona Campus	131	3.63E-03	3.63E-03	3.63E-03	3.63E-03	3.63E-03	3.63E-03	3.63E-03	3.63E-03
44	Hawaii Preparatory Academy, South Kona	128	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03
45	Henry Opukahaia School, Kona Campus	137	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03
46	Holualoa School	135	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03
47	Honaunau School	128	5.17E-03	5.17E-03	5.17E-03	5.17E-03	5.17E-03	5.17E-03	5.17E-03	5.17E-03
48	Hookena School	120	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03
49	Kahakai Elementary School	133	2.98E-03	2.98E-03	2.98E-03	2.98E-03	2.98E-03	2.98E-03	2.98E-03	2.98E-03
50	Kau High & Pahala Elementary School	143	9.13E-02	9.13E-02	9.13E-02	9.13E-02	9.13E-02	9.13E-02	9.13E-02	9.13E-02
51	Kealakehe Elementary School	136	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03
52	Kealakehe Intermediate School	136	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03	2.65E-03
53	Kona Adventist School	128	4.61E-03	4.61E-03	4.61E-03	4.61E-03	4.61E-03	4.61E-03	4.61E-03	4.61E-03
54	Konawaena Elementary School	129	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03
55	Konawaena High & Intermediate School	129	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03
56	Naalehu School	57	4.08E-02	4.08E-02	4.08E-02	4.08E-02	4.08E-02	4.08E-02	4.08E-02	4.08E-02
57	Oceanview Estates School	79	1.17E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02
58	University of Hawaii	129	4.05E-03	4.05E-03	4.05E-03	4.05E-03	4.05E-03	4.05E-03	4.05E-03	4.05E-03
59	University of the Nations	134	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03	2.89E-03
60	Kau Hospital	147	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02
61	Kona Hospital	130	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03	4.10E-03
62	Hillhaven Kona Healthcare Center	131	3.35E-03	3.35E-03	3.35E-03	3.35E-03	3.35E-03	3.35E-03	3.35E-03	3.35E-03
63	Kona Adult Day Care Center	128	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03
64	Punaluu Restaurant	77	9.15E-02	9.15E-02	9.15E-02	9.15E-02	9.15E-02	9.15E-02	9.15E-02	9.15E-02
65	Punaluu Condos	75	9.30E-02	9.30E-02	9.30E-02	9.30E-02	9.30E-02	9.30E-02	9.30E-02	9.30E-02
66	Punaluu Beach Park	73	9.19E-02	9.19E-02	9.19E-02	9.19E-02	9.19E-02	9.19E-02	9.19E-02	9.19E-02

Maximum occurs at Punaluu Condos under Kona (worst case) scenario: 9.30E-02

Revised Table 7-13. CHRONIC HAZARD INDEX DUE TO RELEASE OF ALUMINUM OXIDE DURING NORMAL LAUNCH EVENTS

(Chronic inhalation and oral AEL for Al2O3 = 0.14 mg/kg/day)

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE							
			KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTORN
1	Aloha Montessori Preschool	58	3.38E-01	2.98E-01	2.94E-01	2.95E-01	3.18E-01	2.98E-01	2.98E-01	3.15E-01
2	Creative Day Preschool Inc.	137	2.19E-02	1.98E-02	1.91E-02	1.91E-02	1.98E-02	1.94E-02	1.94E-02	1.99E-02
3	Keauhou Day Care - Kona	132	2.92E-02	2.60E-02	2.54E-02	2.55E-02	2.62E-02	2.58E-02	2.58E-02	2.65E-02
4	Head Start Keiko	134	2.00E-02	2.06E-02	2.01E-02	2.01E-02	2.07E-02	2.04E-02	2.04E-02	2.09E-02
5	Head Start Ka'u Home Base	58	3.33E-01	2.94E-01	2.90E-01	2.91E-01	3.13E-01	2.94E-01	2.94E-01	3.10E-01
6	Kamehameha Schools	126	3.68E-02	3.29E-02	3.21E-02	3.22E-02	3.32E-02	3.26E-02	3.26E-02	3.36E-02
7	Kona Baptist Kealakehe	131	2.95E-02	2.64E-02	2.58E-02	2.58E-02	2.66E-02	2.62E-02	2.62E-02	2.69E-02
8	Kona Hongwanji Preschool	129	3.38E-02	3.01E-02	2.94E-02	2.95E-02	3.04E-02	2.99E-02	2.99E-02	3.07E-02
9	Mokualauea Church Nursery School	134	2.28E-02	2.02E-02	1.97E-02	1.98E-02	2.03E-02	2.00E-02	2.00E-02	2.05E-02
10	Paneia Preschool	143	7.40E-01	6.43E-01	6.42E-01	6.44E-01	7.20E-01	6.59E-01	6.59E-01	7.00E-01
11	Pat Ulli Waldorf School	128	2.53E-02	3.15E-02	3.06E-02	3.09E-02	3.18E-02	3.13E-02	3.13E-02	3.22E-02
12	Salvation Army Ohana Keiki Day Care Center	134	2.30E-02	2.06E-02	2.01E-02	2.01E-02	2.07E-02	2.04E-02	2.04E-02	2.09E-02
13	University of the Nations	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
14	Sherry Alves	128	3.84E-02	3.26E-02	3.18E-02	3.19E-02	3.29E-02	3.23E-02	3.23E-02	3.32E-02
15	Maija Abaya	138	2.15E-02	1.92E-02	1.87E-02	1.88E-02	1.93E-02	1.90E-02	1.90E-02	1.95E-02
16	Trina Alapai	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
17	Joann Bisher	126	3.68E-02	3.29E-02	3.21E-02	3.22E-02	3.32E-02	3.26E-02	3.26E-02	3.36E-02
18	Dawn Bradford	137	1.88E-02	1.68E-02	1.64E-02	1.65E-02	1.69E-02	1.67E-02	1.67E-02	1.71E-02
19	Keiki Corner	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
20	Lucy Delaries	136	2.19E-02	1.96E-02	1.91E-02	1.91E-02	1.96E-02	1.94E-02	1.94E-02	1.99E-02
21	Cammy Featherstone	133	2.57E-02	2.29E-02	2.24E-02	2.25E-02	2.31E-02	2.28E-02	2.28E-02	2.34E-02
22	Nancy Fujimoto	133	2.61E-02	2.33E-02	2.27E-02	2.28E-02	2.35E-02	2.31E-02	2.31E-02	2.37E-02
23	Pat Gibson	139	1.96E-02	1.75E-02	1.71E-02	1.71E-02	1.75E-02	1.73E-02	1.73E-02	1.77E-02
24	Chris Hagerman	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
25	Kathy Lossasso Hanlon	138	2.22E-02	1.99E-02	1.94E-02	1.94E-02	2.00E-02	1.97E-02	1.97E-02	2.02E-02
26	Sandra Hanson	138	2.11E-02	1.88E-02	1.84E-02	1.84E-02	1.89E-02	1.87E-02	1.87E-02	1.92E-02
27	Debbie Hedemann	128	3.68E-02	3.29E-02	3.21E-02	3.22E-02	3.32E-02	3.26E-02	3.26E-02	3.36E-02
28	Linda Hester	136	2.22E-02	1.99E-02	1.94E-02	1.94E-02	2.00E-02	1.97E-02	1.97E-02	2.02E-02
29	Mama Kin In	136	2.15E-02	1.92E-02	1.87E-02	1.88E-02	1.93E-02	1.90E-02	1.90E-02	1.95E-02
30	B.J. Lemnah	137	1.92E-02	1.71E-02	1.67E-02	1.68E-02	1.72E-02	1.70E-02	1.70E-02	1.74E-02
31	Kristen Learns	130	2.80E-02	2.50E-02	2.44E-02	2.45E-02	2.52E-02	2.48E-02	2.48E-02	2.55E-02
32	Barbara Legg	138	1.96E-02	1.75E-02	1.71E-02	1.71E-02	1.75E-02	1.73E-02	1.73E-02	1.77E-02
33	Gail McLeod	136	1.84E-02	1.65E-02	1.61E-02	1.61E-02	1.65E-02	1.63E-02	1.63E-02	1.67E-02
34	Lydia Pope	138	1.99E-02	1.79E-02	1.74E-02	1.74E-02	1.79E-02	1.77E-02	1.77E-02	1.81E-02
35	Irene Rittmeister	137	1.88E-02	1.68E-02	1.64E-02	1.65E-02	1.69E-02	1.67E-02	1.67E-02	1.71E-02
36	Debbie Seiss	138	1.99E-02	1.79E-02	1.74E-02	1.74E-02	1.79E-02	1.77E-02	1.77E-02	1.81E-02
37	Jill Terwilliger	134	2.42E-02	2.16E-02	2.11E-02	2.11E-02	2.17E-02	2.14E-02	2.14E-02	2.19E-02
38	Alisa Vegas	139	1.96E-02	1.75E-02	1.71E-02	1.71E-02	1.75E-02	1.73E-02	1.73E-02	1.77E-02
39	Loren Victorine	126	3.64E-02	3.28E-02	3.18E-02	3.19E-02	3.29E-02	3.23E-02	3.23E-02	3.32E-02
40	Angela Walton	135	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
41	Jodi Walton	142	1.88E-02	1.68E-02	1.64E-02	1.65E-02	1.69E-02	1.67E-02	1.67E-02	1.71E-02
42	Pam Yamashita	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
43	Hawaii Preparatory Academy, Kona Campus	131	2.99E-02	2.68E-02	2.61E-02	2.61E-02	2.70E-02	2.65E-02	2.65E-02	2.72E-02
44	Hawaii Preparatory Academy, South Kona	128	3.53E-02	3.15E-02	3.08E-02	3.09E-02	3.18E-02	3.13E-02	3.13E-02	3.22E-02
45	Henry Opukahaia School, Kona Campus	137	2.19E-02	1.96E-02	1.91E-02	1.91E-02	1.96E-02	1.94E-02	1.94E-02	1.99E-02
46	Holualoa School	135	2.57E-02	2.29E-02	2.24E-02	2.25E-02	2.31E-02	2.28E-02	2.28E-02	2.34E-02
47	Honaunau School	126	4.26E-02	3.80E-02	3.71E-02	3.72E-02	3.84E-02	3.77E-02	3.77E-02	3.89E-02
48	Hookena School	120	4.83E-02	4.32E-02	4.21E-02	4.23E-02	4.36E-02	4.29E-02	4.29E-02	4.42E-02
49	Kahalua Elementary School	133	2.45E-02	2.19E-02	2.14E-02	2.15E-02	2.21E-02	2.18E-02	2.18E-02	2.23E-02
50	Kau High & Pahala Elementary School	143	7.52E-01	6.54E-01	6.52E-01	6.55E-01	7.34E-01	6.68E-01	6.68E-01	7.09E-01
51	Keaiwahe Elementary School	136	2.19E-02	1.96E-02	1.91E-02	1.91E-02	1.96E-02	1.94E-02	1.94E-02	1.99E-02
52	Keaiwahe Intermediate School	136	2.19E-02	1.96E-02	1.91E-02	1.91E-02	1.96E-02	1.94E-02	1.94E-02	1.99E-02
53	Kona Adventist School	126	3.80E-02	3.39E-02	3.31E-02	3.32E-02	3.43E-02	3.37E-02	3.37E-02	3.48E-02
54	Konawaena Elementary School	129	3.45E-02	3.09E-02	3.01E-02	3.02E-02	3.11E-02	3.06E-02	3.06E-02	3.15E-02
55	Konawaena High & Intermediate School	129	3.45E-02	3.09E-02	3.01E-02	3.02E-02	3.11E-02	3.06E-02	3.06E-02	3.15E-02
56	Naalehu School	57	3.34E-01	2.96E-01	2.92E-01	2.94E-01	3.16E-01	2.98E-01	2.98E-01	3.13E-01
57	Oceanview Estates School	79	9.82E-02	8.57E-02	8.38E-02	8.42E-02	8.68E-02	8.53E-02	8.53E-02	8.87E-02
58	University of Hawaii	129	3.34E-02	2.96E-02	2.91E-02	2.92E-02	3.01E-02	2.95E-02	2.95E-02	3.04E-02
59	University of the Nations	134	2.38E-02	2.12E-02	2.07E-02	2.08E-02	2.14E-02	2.11E-02	2.11E-02	2.16E-02
60	Kau Hospital	147	7.40E-01	6.43E-01	6.42E-01	6.44E-01	7.29E-01	6.59E-01	6.59E-01	7.00E-01
61	Kona Hospital	130	3.38E-02	3.01E-02	2.94E-02	2.95E-02	3.04E-02	2.99E-02	2.99E-02	3.07E-02
62	Hilltaven Kona Healthcare Center	131	2.76E-02	2.47E-02	2.40E-02	2.42E-02	2.49E-02	2.45E-02	2.45E-02	2.31E-02
63	Kona Adult Day Care Center	128	3.84E-02	3.26E-02	3.18E-02	3.19E-02	3.29E-02	3.23E-02	3.23E-02	3.32E-02
64	Puneluu Restaurant	77	7.54E-01	6.56E-01	6.54E-01	6.57E-01	7.37E-01	6.70E-01	6.70E-01	7.11E-01
65	Puneluu Condos	75	7.66E-01	6.66E-01	6.65E-01	6.68E-01	7.45E-01	6.80E-01	6.80E-01	7.21E-01
66	Puneluu Beach Park	73	7.57E-01	6.58E-01	6.57E-01	6.60E-01	7.40E-01	6.72E-01	6.72E-01	7.14E-01

Maximum occurs at Puneluu Condos under Kona (worst case) scenario: 7.66E-01

Revised Table 7-14. CHRONIC HAZARD INDEX DUE TO RELEASE OF HYDROGEN CHLORIDE AND ALUMINUM OXIDE DURING A NORMAL LAUNCH

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE							
			KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTORN
1	Aloha Montessori Preschool	58	4.28E-01	3.25E-01	2.97E-01	3.06E-01	3.97E-01	3.29E-01	3.14E-01	3.72E-01
2	Creative Day Preschool Inc.	137	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.05E-02
3	Keauhou Day Care - Kona	132	5.44E-02	3.48E-02	2.59E-02	2.84E-02	4.68E-02	3.34E-02	2.97E-02	4.25E-02
4	Head Start Keiko	134	4.53E-02	2.83E-02	2.05E-02	2.25E-02	3.86E-02	2.77E-02	2.38E-02	3.50E-02
5	Head Start Ka'u Home Base	58	4.21E-01	3.21E-01	2.92E-01	3.02E-01	3.91E-01	3.25E-01	3.10E-01	3.67E-01
6	Kamehameha Schools	126	6.55E-02	4.28E-02	3.28E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
7	Kona Baptist Kealakehe	131	5.53E-02	3.52E-02	2.62E-02	2.87E-02	4.75E-02	3.39E-02	3.01E-02	4.29E-02
8	Kona Hongwanji Preschool	129	6.09E-02	3.94E-02	2.99E-02	3.24E-02	5.28E-02	3.81E-02	3.43E-02	4.77E-02
9	Mokualauea Church Nursery School	134	4.50E-02	2.80E-02	2.02E-02	2.22E-02	3.83E-02	2.66E-02	2.34E-02	3.41E-02
10	Paneia Preschool	143	7.67E-01	6.43E-01	6.42E-01	6.53E-01	7.53E-01	7.03E-01	7.01E-01	8.12E-01
11	Pat Ulli Waldorf School	128	6.34E-02	4.12E-02	3.12E-02	3.38E-02	5.51E-02	4.00E-02	3.56E-02	4.97E-02
12	Salvation Army Ohana Keiki Day Care Center	134	4.53E-02	2.83E-02	2.05E-02	2.25E-02	3.86E-02	2.77E-02	2.38E-02	3.50E-02
13	University of the Nations	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
14	Sherry Alves	128	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.87E-02	4.11E-02	3.67E-02	5.12E-02
15	Maija Abaya	138	4.33E-02	2.70E-02	1.92E-02	2.12E-02	3.68E-02	2.58E-02	2.24E-02	3.31E-02
16	Trina Alapai	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
17	Joann Bisher	128	6.55E-02	4.26E-02	3.26E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
18	Dawn Bradford	137	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
19	Keiki Corner	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
20	Lucy Delaries	136	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
21	Cammy Featherstone	133	4.95E-02	3.12E-02	2.29E-02	2.49E-02	4.20E-02	3.01E-02	2.67E-02	3.79E-02
22	Nancy Fujimoto	133	5.04E-02	3.15E-02	2.32E-02	2.52E-02	4.29E-02	3.04E-02	2.70E-02	3.88E-02
23	Pat Gibson	139	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
24	Chris Hagerman	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
25	Kathy Lossasso Hanlon	138	4.48E-02	2.77E-02	1.99E-02	2.19E-02	3.80E-02	2.65E-02	2.31E-02	3.38E-02
26	Sandra Hanson	138	4.25E-02	2.61E-02	1.89E-02	2.08E-02	3.59E-02	2.50E-02	2.21E-02	3.23E-02
27	Debbie Hedemann	128	6.55E-02	4.26E-02	3.26E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
28	Linda Hester	136	4.48E-02	2.77E-02	1.99E-02	2.19E-02	3.80E-02	2.65E-02	2.31E-02	3.38E-02
29	Mama Kin In	136	4.33E-02	2.70E-02	1.92E-02	2.12E-02	3.68E-02	2.58E-02	2.24E-02	3.31E-02
30	B.J. Lemnah	137	3.94E-02	2.44E-02	1.72E-02	1.92E-02	3.32E-02	2.33E-02	2.04E-02	3.00E-02
31	Kristen Learns	130	5.26E-02	3.37E-02	2.49E-02	2.74E-02	4.51E-02	3.26E-02	2.87E-02	4.10E-02
32	Barbara Legg	138	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
33	Gail McLeod	136	3.88E-02	2.38E-02	1.68E-02	1.85E-02	3.25E-02	2.26E-02	1.97E-02	2.94E-02
34	Lydia Pope	138	4.08E-02	2.51E-02	1.79E-02	1.99E-02	3.44E-02	2.40E-02	2.11E-02	3.12E-02
35	Irene Rittmeister	137	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
36	Debbie Seiss	138	4.08E-02	2.51E-02	1.79E-02	1.99E-02	3.44E-02	2.40E-02	2.11E-02	3.12E-02
37	Jill Terwilliger	134	4.70E-02	2.93E-02	2.15E-02	2.35E-02	4.02E-02	2.57E-02	2.46E-02	3.60E-02
38	Alisa Vegas	139	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
39	Loren Victorine	126	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.87E-02	4.11E-02	3.67E-02	5.12E-02
40	Angela Walton	135	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
41	Jodi Walton	142	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
42	Pam Yamashita	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
43	Hawaii Preparatory Academy, Kona Campus	131	5.57E-02	3.55E-02	2.64E-02	2.91E-02	4.78E-02	3.43E-02	3.04E-02	4.32E-02
44	Hawaii Preparatory Academy, South Kona	128	6.34E-02	4.12E-02	3.12E-02	3.38E-02	5.51E-02	4.00E-02	3.56E-02	4.97E-02
45	Henry Opukahaia School, Kona Campus	137	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
46	Holualoa School	135	4.95E-02	3.12E-02	2.29E-02	2.49E-02	4.20E-02	3.01E-02	2.67E-02	3.79E-02
47	Honaunau School	126	7.37E-02	4.87E-02	3.78E-02	4.06E-02	6.47E-02	4.74E-02	4.26E-02	5.83E-02
48	Hookena School	120	8.13E-02	5.46E-02	4.26E-02	4.61E-02	7.18E-02	5.31E-02	4.82E-02	6.50E-02
49	Kahalua Elementary School	133	4.79E-02	3.02E-02	2.19E-02	2.39E-02	4.10E-02	2.91E-02	2.57E-02	3.89E-02
50	Kau High & Pahala Elementary School	143	7.88E-01	6.54E-01	6.52E-01	6.86E-01	7.88E-01	7.18E-01	7.08E-01	8.19E-01
51	Keaiwahe Elementary School	136	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
52	Keaiwahe Intermediate School	136	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
53	Kona Adventist School	126	6.71E-02	4.41E-02	3.38E-02	3.66E-02	5.85E-02	4.29E-02	3.85E-02	5.31E-02
54	Konawaena Elementary School	129	6.22E-02	4.06E-02	3.08E-02	3.31E-02	5.39E-02	3.93E-02	3.50E-02	4.85E-02
55	Konawaena High & Intermediate School	129	6.22E-02	4.06E-02	3.08E-02	3.31E-02	5.39E-02	3.93E-02	3.50E-02	4.85E-02
56	Naalehu School	57	4.24E-01	3.23E-01	2.95E-01	3.05E-01	3.95E-01	3.26E-01	3.12E-01	3.70E-01
57	Oceanview Estates School	79	1.47E-01	1.02E-01	8.49E-02	9.96E-02	1.32E-01	1.00E-01	9.30E-02	1.19E-01
58	University of Hawaii	129	6.08E-02	3.90E-02	2.96E-02	3.21E-02	5.24E-02	3.78E-02	3.39E-02	4.74E-02
59	University of the Nations	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.98E-02	2.84E-02	2.45E-02	3.57E-02
60	Kau Hospital	147	7.67E-01	6.43E-01	6.42E-01	6.53E-01	7.53E-01	7.03E-01	7.01E-01	8.12E-01
61	Kona Hospital	130	6.09E-02	3.94E-02	2.99E-02	3.24E-02	5.28E-02	3.81E-02	3.43E-02	4.77E-02
62	Hilltaven Kona Healthcare Center	131	5.24E-02	3.34E-02	2.45E-02	2.71E-02	4.48E-02	3.22E-02	2.83E-02	4.07E-02
63	Kona Adult Day Care Center	128	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.87E-02	4.11E-02	3.67E-02	5.12E-02
64	Puneluu Restaurant	77	7.91E-01	6.56E-01	6.54E-01	6.67E-01	7.71E-01	7.18E-01	7.09E-01	8.20E-01
65	Puneluu Condos	75	8.14E-01	6.66E-01	6.65E-01	6.81E-01	7.87E-01	7.31E-01	7.17E-01	8.27E-01
66	Puneluu Beach Park	73	7.97E-01	6.59E-01	6.57E-01	6.71E-01	7.75E-01	7.21E-01	7.11E-01	8.21E-01

Maximum occurs at Puneluu Condos under Kona (worst case) scenario: 8.27E-01

Revised Table 8-11. CHRONIC SOIL INGESTION DOSE DUE TO RELEASE OF ALUMINUM OXIDE DURING AN ON-PAD VEHICLE CONFLAGRATION INVOLVING 9 SOLID ROCKET BOOSTERS (SRBs)
(IN mg/kg/day Al2O3)

Rec. #	Receptor Name	Wind Sector	mg/kg/day Al2O3
1	Aloha Montessori Preschool	88	1.38E-08
2	Creative Day Preschool Inc.	137	6.18E-09
3	Keauhou Day Care - Kona	132	1.09E-08
4	Head Start Kailua	134	8.61E-09
5	Head Start Ka'u Home Base	88	1.58E-08
6	Kamehameha Schools	128	1.36E-08
7	Kona Seamen Keiklland	131	1.11E-08
8	Kona Hongwanji Preschool	129	1.28E-08
9	Mokuaikaua Church Nursery School	134	8.51E-09
10	Parents Preschool	143	1.90E-08
11	Pali Lili Waldorf School	129	1.30E-08
12	Salvation Army Ohana Keiki Day Care	134	8.61E-09
13	University of the Nations	134	8.79E-09
14	Sherry Akea	128	1.34E-08
15	Maria Abaya	136	8.18E-09
16	Tina Alapai	134	8.61E-09
17	Joann Bishop	128	1.35E-08
18	Dawn Bradford	137	6.96E-09
19	Keiki Corner	134	8.79E-09
20	Lucy Delarosa	136	8.18E-09
21	Cammy Featherstone	133	9.46E-09
22	Nancy Fujimoto	133	9.76E-09
23	Pat Gibson	139	7.38E-09
24	Chris Hagerman	134	8.86E-09
25	Kathy Lessons Harden	139	6.98E-09
26	Sandra Hansen	139	7.68E-09
27	Debbie Hedemann	128	1.36E-08
28	Linda Hesser	139	6.41E-09
29	Mama Kin In	136	8.12E-09
30	S.J. Lemmah	137	7.09E-09
31	Kristen Loerne	130	1.04E-08
32	Barbara Legg	139	7.38E-09
33	Gail McLeod	139	6.89E-09
34	Lydia Pope	139	7.42E-09
35	Irene Rittmeister	137	7.09E-09
36	Debbie Sato	139	7.42E-09
37	Jill Terwilliger	134	8.86E-09
38	Alisa Vegas	139	7.32E-09
39	Loran Victorine	128	1.38E-08
40	Angela Walton	139	6.88E-09
41	Jodi Walton	142	6.06E-09
42	Pam Yamashita	134	8.51E-09
43	Hawaii Preparatory Academy, Kona	131	1.11E-08
44	Hawaii Preparatory Academy, S. Kona	128	1.31E-08
45	Henry Opukahaia School, Kona Campus	137	8.22E-09
46	Hakalau School	139	9.71E-09
47	Honaunau School	128	1.35E-08
48	Heeia School	129	1.71E-08
49	Kahakai Elementary School	133	9.28E-09
50	Kau High & Pahala Elementary School	143	2.29E-08
51	Keaiwaha Elementary School	138	8.25E-09
52	Keaiwaha Intermediate School	139	8.25E-09
53	Kona Adventist School	128	1.39E-08
54	Konawaena Elementary School	129	1.28E-08
55	Konawaena High & Intermediate School	128	1.28E-08
56	Naalehu School	87	1.34E-08
57	Ocean View Estates School	79	2.31E-08
58	University of Hawaii	128	1.24E-08
59	University of the Nations	134	8.79E-09
60	Kau Hospital	147	1.90E-08
61	Kona Hospital	139	1.28E-08
62	Hillhaven Kona Healthcare Center	131	1.04E-08
63	Kona Adult Day Care Center	128	1.34E-08
64	Punaluu Restaurant	77	2.26E-08
65	Punaluu Condos	78	2.93E-08
66	Punaluu Beach Park	73	3.53E-08

Maximum occurs at Ocean View Estates School, 9 SRBs burning 2.31E-08

Revised Table 8-12. CHRONIC HAZARD INDEX DUE TO RELEASE OF ALUMINUM OXIDE DURING AN ON-PAD VEHICLE CONFLAGRATION INVOLVING 9 SOLID ROCKET BOOSTERS (SRBs)
(Chronic inhalation and oral ABL for Al2O3 = 0.14 mg/kg/day)

Rec. #	Receptor Name	Wind Sector	Chronic HI
1	Aloha Montessori Preschool	88	1.28E-04
2	Creative Day Preschool Inc.	137	6.74E-05
3	Keauhou Day Care - Kona	132	8.98E-05
4	Head Start Kailua	134	7.15E-05
5	Head Start Ka'u Home Base	88	1.30E-04
6	Kamehameha Schools	128	1.12E-04
7	Kona Seamen Keiklland	131	9.12E-05
8	Kona Hongwanji Preschool	129	1.03E-04
9	Mokuaikaua Church Nursery School	134	7.01E-05
10	Parents Preschool	143	1.48E-05
11	Pali Lili Waldorf School	129	1.07E-04
12	Salvation Army Ohana Keiki Day Care	134	7.10E-05
13	University of the Nations	134	7.23E-05
14	Sherry Akea	128	1.11E-04
15	Maria Abaya	136	6.71E-05
16	Tina Alapai	134	7.34E-05
17	Joann Bishop	128	1.12E-04
18	Dawn Bradford	137	5.73E-05
19	Keiki Corner	134	7.23E-05
20	Lucy Delarosa	136	6.71E-05
21	Cammy Featherstone	133	7.98E-05
22	Nancy Fujimoto	133	8.03E-05
23	Pat Gibson	139	6.06E-05
24	Chris Hagerman	134	7.29E-05
25	Kathy Lessons Harden	139	6.90E-05
26	Sandra Hansen	139	6.47E-05
27	Debbie Hedemann	128	1.12E-04
28	Linda Hesser	139	5.93E-05
29	Mama Kin In	136	6.68E-05
30	S.J. Lemmah	137	5.84E-05
31	Kristen Loerne	130	8.60E-05
32	Barbara Legg	139	6.06E-05
33	Gail McLeod	139	5.67E-05
34	Lydia Pope	139	6.11E-05
35	Irene Rittmeister	137	5.81E-05
36	Debbie Sato	139	6.11E-05
37	Jill Terwilliger	134	7.40E-05
38	Alisa Vegas	139	6.03E-05
39	Loran Victorine	128	1.11E-04
40	Angela Walton	139	7.32E-05
41	Jodi Walton	142	5.73E-05
42	Pam Yamashita	134	7.29E-05
43	Hawaii Preparatory Academy, Kona	131	9.12E-05
44	Hawaii Preparatory Academy, S. Kona	128	1.08E-04
45	Henry Opukahaia School, Kona Campus	137	6.77E-05
46	Hakalau School	139	8.00E-05
47	Honaunau School	128	1.28E-04
48	Heeia School	128	1.41E-04
49	Kahakai Elementary School	133	7.64E-05
50	Kau High & Pahala Elementary School	143	1.88E-05
51	Keaiwaha Elementary School	138	6.79E-05
52	Keaiwaha Intermediate School	138	6.79E-05
53	Kona Adventist School	128	1.15E-04
54	Konawaena Elementary School	129	1.03E-04
55	Konawaena High & Intermediate School	129	1.06E-04
56	Naalehu School	87	1.28E-04
57	Ocean View Estates School	79	2.07E-04
58	University of Hawaii	128	1.02E-04
59	University of the Nations	134	7.23E-05
60	Kau Hospital	147	1.48E-05
61	Kona Hospital	139	1.03E-04
62	Hillhaven Kona Healthcare Center	131	8.55E-05
63	Kona Adult Day Care Center	128	1.11E-04
64	Punaluu Restaurant	77	1.97E-05
65	Punaluu Condos	78	2.41E-05
66	Punaluu Beach Park	73	2.08E-05

Maximum occurs at Ocean View Estates School, 9 SRBs burning 2.07E-04

Revised Table 6-13. CHRONIC HAZARD INDEX DUE TO RELEASE OF HCl and Al2O3 DURING AN ON-PAD VEHICLE CONFLAGRATION INVOLVING 9 SOLID ROCKET BOOSTERS (SRBs)

Rec. #	Receptor Name	Wind Bearing	Chronic HI
1	Aloha Montessori Preschool	56	1.33E-04
2	Creative Day Preschool Inc.	127	1.00E-04
3	Keauhou Day Care - Kona	132	1.25E-04
4	Head Start Kailua	124	1.04E-04
5	Head Start Ka'u Home Base	58	1.38E-04
6	Kamehameha Schools	128	1.46E-04
7	Kona Baptist Keiklland	131	1.27E-04
8	Kona Hongwanji Preschool	129	1.28E-04
9	Mokuaikaua Church Nursery School	134	1.03E-04
10	Pahala Preschool	143	1.88E-05
11	Pali Ui Waldorf School	128	1.44E-04
12	Salvation Army Ohana Keiki Day Care	134	1.04E-04
13	University of the Nations	134	1.06E-04
14	Sherry Ahrens	128	1.48E-04
15	Maria Abaya	136	9.97E-05
16	Trina Alapai	134	1.07E-04
17	Joann Sishaw	128	1.48E-04
18	Dawn Bradford	137	8.79E-05
19	Keiki Corner	134	1.06E-04
20	Lucy Deteriee	136	9.97E-05
21	Cammy Featherstone	133	1.14E-04
22	Nancy Fujimoto	133	1.15E-04
23	Pat Gibson	139	8.18E-05
24	Chris Hagerman	134	1.06E-04
25	Kathy Lossess Hanlon	136	1.02E-04
26	Sandra Hanson	138	8.86E-05
27	Debbie Hedemann	128	1.46E-04
28	Linda Hesser	136	1.02E-04
29	Merna Kin In	136	9.91E-05
30	S.J. Lemmah	137	8.92E-05
31	Kristen Leonna	130	1.21E-04
32	Barbara Legg	138	8.16E-05
33	Gail McLeod	136	8.72E-05
34	Lydia Pope	136	8.23E-05
35	Irma Rittmeister	137	8.84E-05
36	Debbie Sass	136	8.23E-05
37	Jill Terwilliger	134	1.06E-04
38	Alice Vegas	139	8.15E-05
39	Loren Victorine	128	1.46E-04
40	Angela Walton	135	1.06E-04
41	Jodi Walton	142	8.78E-05
42	Pam Yamashita	134	1.06E-04
43	Hawaii Preparatory Academy, Kona	131	1.27E-04
44	Hawaii Preparatory Academy, S. Kona	128	1.46E-04
45	Henry Opukahaia School, Kona Campus	137	1.00E-04
46	Holualoa School	135	1.14E-04
47	Honaunau School	129	1.66E-04
48	Hookena School	120	1.78E-04
49	Kahalu'u Elementary School	133	1.10E-04
50	Kau High & Pahala Elementary School	143	1.96E-05
51	Keaiwaha Elementary School	136	1.01E-04
52	Keaiwaha Intermediate School	136	1.01E-04
53	Kona Adventist School	128	1.32E-04
54	Konawaena Elementary School	129	1.42E-04
55	Konawaena High & Intermediate School	129	1.42E-04
56	Naalehu School	57	1.34E-04
57	Ocean View Estates School	79	2.32E-04
58	University of Hawaii	128	1.36E-04
59	University of the Nations	134	1.06E-04
60	Ka'u Hospital	147	1.35E-05
61	Kona Hospital	130	1.26E-04
62	Hilltop Kona Healthcare Center	131	1.21E-04
63	Kona Adult Day Care Center	128	1.47E-04
64	Punalu'u Restaurant	77	2.04E-05
65	Punalu'u Condos	75	2.46E-05
66	Punalu'u Beach Park	73	2.15E-05

Maximum occurs at Ocean View Estates School, 9 SRBs burning 2.32E-04

Revised Table 6-26. CHRONIC SOIL INGESTION DOSE DUE TO RELEASE OF ALUMINUM OXIDE DURING CONFLAGRATION OF AN ASCENDING DELTA II 7925 OCCURING AT 10 SECONDS AFTER LIFTOFF (IN mg/kg/day Al2O3)

Rec. #	Receptor Name	Wind Bearing	mg/kg/day Al2O3
1	Aloha Montessori Preschool	56	2.53E-05
2	Creative Day Preschool Inc.	127	1.60E-06
3	Keauhou Day Care - Kona	132	2.10E-06
4	Head Start Kailua	124	1.68E-06
5	Head Start Ka'u Home Base	58	2.61E-05
6	Kamehameha Schools	128	2.88E-06
7	Kona Baptist Keiklland	131	2.14E-06
8	Kona Hongwanji Preschool	129	2.43E-06
9	Mokuaikaua Church Nursery School	134	1.63E-06
10	Pahala Preschool	143	1.99E-04
11	Pali Ui Waldorf School	128	2.58E-06
12	Salvation Army Ohana Keiki Day Care	134	1.66E-06
13	University of the Nations	134	1.70E-06
14	Sherry Ahrens	128	2.63E-06
15	Maria Abaya	136	1.58E-06
16	Trina Alapai	134	1.70E-06
17	Joann Sishaw	128	2.58E-06
18	Dawn Bradford	137	1.33E-06
19	Keiki Corner	134	1.70E-06
20	Lucy Deteriee	136	1.60E-06
21	Cammy Featherstone	133	1.86E-06
22	Nancy Fujimoto	133	1.86E-06
23	Pat Gibson	139	1.40E-06
24	Chris Hagerman	134	1.70E-06
25	Kathy Lossess Hanlon	136	1.63E-06
26	Sandra Hanson	138	1.53E-06
27	Debbie Hedemann	128	2.66E-06
28	Linda Hesser	136	1.63E-06
29	Merna Kin In	136	1.56E-06
30	S.J. Lemmah	137	1.36E-06
31	Kristen Leonna	130	2.03E-06
32	Barbara Legg	138	1.40E-06
33	Gail McLeod	136	1.33E-06
34	Lydia Pope	136	1.43E-06
35	Irma Rittmeister	137	1.36E-06
36	Debbie Sass	136	1.43E-06
37	Jill Terwilliger	134	1.70E-06
38	Alice Vegas	139	1.40E-06
39	Loren Victorine	128	2.63E-06
40	Angela Walton	135	1.70E-06
41	Jodi Walton	142	1.33E-06
42	Pam Yamashita	134	1.70E-06
43	Hawaii Preparatory Academy, Kona	131	2.14E-06
44	Hawaii Preparatory Academy, S. Kona	128	2.58E-06
45	Henry Opukahaia School, Kona Campus	137	1.60E-06
46	Holualoa School	135	1.86E-06
47	Honaunau School	129	3.09E-06
48	Hookena School	120	3.53E-06
49	Kahalu'u Elementary School	133	1.76E-06
50	Kau High & Pahala Elementary School	143	1.82E-04
51	Keaiwaha Elementary School	136	1.60E-06
52	Keaiwaha Intermediate School	136	1.60E-06
53	Kona Adventist School	128	2.73E-06
54	Konawaena Elementary School	129	2.49E-06
55	Konawaena High & Intermediate School	129	2.49E-06
56	Naalehu School	57	2.63E-05
57	Ocean View Estates School	79	7.29E-06
58	University of Hawaii	128	2.39E-06
59	University of the Nations	134	1.70E-06
60	Ka'u Hospital	147	1.89E-04
61	Kona Hospital	130	2.43E-06
62	Hilltop Kona Healthcare Center	131	2.00E-06
63	Kona Adult Day Care Center	128	2.63E-06
64	Punalu'u Restaurant	77	1.58E-04
65	Punalu'u Condos	75	1.30E-04
66	Punalu'u Beach Park	73	1.51E-04

Maximum occurs at Pahala Preschool and Ka'u Hospital at 10 seconds after liftoff 1.89E-04

Revised Table 6-28. CHRONIC HAZARD INDEX DUE TO RELEASE OF HYDROGEN CHLORIDE AND ALUMINUM OXIDE DUE TO CONFLAGRATION OF A VEHICLE IN ASCENT AT 5 SECONDS AFTER LIFTOFF

Rec. #	Receptor Name	Wind Bearing	CHRONIC HI
1	Aloha Montessori Preschool	58	3.60E-04
2	Creative Day Preschool Inc.	137	7.90E-05
3	Keauhou Day Care - Kona	132	9.25E-05
4	Head Start Kailua	134	8.13E-05
5	Head Start Ka'u Home Base	58	3.54E-04
6	Kamehameha Schools	128	1.06E-04
7	Kona Baptist Keiklland	131	9.34E-05
8	Kona Hongwanji Preschool	129	1.01E-04
9	Moiwaikaua Church Nursery School	134	8.06E-05
10	Pahala Preschool	143	1.66E-03
11	Pali Uli Waldorf School	128	1.03E-04
12	Salvation Army Ohana Keiki Day Care	134	8.13E-05
13	University of the Nations	134	8.22E-05
14	Sherry Alves	128	1.06E-04
15	Maija Abeya	136	7.67E-05
16	Trina Alapai	134	8.29E-05
17	Joann Bishaw	128	1.06E-04
18	Dawn Bradford	137	7.26E-05
19	Keiki Corner	134	8.22E-05
20	Lucy Delaries	136	7.90E-05
21	Cammy Featherstone	133	8.64E-05
22	Nancy Fujimoto	133	8.68E-05
23	Pat Gibson	139	7.49E-05
24	Chris Hagerman	134	8.26E-05
25	Kathy Lossess Hanlon	136	8.03E-05
26	Sandra Hanson	136	7.77E-05
27	Debbie Hedemann	128	1.06E-04
28	Linda Hester	136	8.03E-05
29	Merna Kin In	136	7.87E-05
30	B.J. Lemrah	137	7.35E-05
31	Kristen Leoma	130	9.06E-05
32	Barbara Legg	136	7.49E-05
33	Gail McLeod	136	7.26E-05
34	Lydia Pope	138	7.51E-05
35	Irma Rittmeister	137	7.32E-05
36	Debbie Sass	136	7.51E-05
37	Jill Terwilliger	134	8.32E-05
38	Alisa Vegas	139	7.45E-05
39	Loran Victorine	128	1.06E-04
40	Angela Walton	135	8.26E-05
41	Jodi Walton	142	7.26E-05
42	Pam Yamashita	134	8.29E-05
43	Hawaii Preparatory Academy, Kona	131	9.36E-05
44	Hawaii Preparatory Academy, S. Kona	128	1.04E-04
45	Henry Opukahaia School, Kona Campus	137	7.93E-05
46	Holualoa School	135	8.68E-05
47	Honaunau School	128	1.17E-04
48	Hookena School	120	1.28E-04
49	Kahaluu Elementary School	133	8.45E-05
50	Kau High & Pahala Elementary School	143	1.46E-03
51	Keaiakaha Elementary School	136	7.93E-05
52	Keaiakaha Intermediate School	136	7.93E-05
53	Kona Adventist School	128	1.06E-04
54	Konawaena Elementary School	129	1.02E-04
55	Konawaena High & Intermediate School	129	1.02E-04
56	Naalehu School	57	3.56E-04
57	Ocean View Estates School	79	2.23E-04
58	University of Hawaii	129	9.99E-05
59	University of the Nations	134	8.22E-05
60	Kau Hospital	147	1.65E-03
61	Kona Hospital	130	1.01E-04
62	Hillhaven Kona Healthcare Center	131	9.03E-05
63	Kona Adult Day Care Center	128	1.05E-04
64	Punaluu Restaurant	77	1.45E-03
65	Punaluu Condos	75	1.28E-03
66	Punaluu Beach Park	73	1.40E-03

Maximum occurs at Pahala Preschool and Kau Hospital 1.66E-03

Revised Table 6-29. CHRONIC HAZARD INDEX DUE TO RELEASE OF HYDROGEN CHLORIDE AND ALUMINUM OXIDE DUE TO CONFLAGRATION OF A VEHICLE IN ASCENT AT 10 SECONDS AFTER LIFTOFF

Rec. #	Receptor Name	Wind Bearing	CHRONIC HI
1	Aloha Montessori Preschool	58	4.61E-04
2	Creative Day Preschool Inc.	137	4.81E-05
3	Keauhou Day Care - Kona	132	5.51E-05
4	Head Start Kailua	134	4.73E-05
5	Head Start Ka'u Home Base	58	4.74E-04
6	Kamehameha Schools	128	6.46E-05
7	Kona Baptist Keiklland	131	5.60E-05
8	Kona Hongwanji Preschool	129	6.06E-05
9	Moiwaikaua Church Nursery School	134	4.67E-05
10	Pahala Preschool	143	2.43E-03
11	Pali Uli Waldorf School	128	6.27E-05
12	Salvation Army Ohana Keiki Day Care	134	4.73E-05
13	University of the Nations	134	4.80E-05
14	Sherry Alves	128	6.40E-05
15	Maija Abeya	136	4.58E-05
16	Trina Alapai	134	4.80E-05
17	Joann Bishaw	128	6.42E-05
18	Dawn Bradford	137	4.18E-05
19	Keiki Corner	134	4.80E-05
20	Lucy Delaries	136	4.61E-05
21	Cammy Featherstone	133	5.11E-05
22	Nancy Fujimoto	133	5.11E-05
23	Pat Gibson	139	4.31E-05
24	Chris Hagerman	134	4.80E-05
25	Kathy Lossess Hanlon	136	4.67E-05
26	Sandra Hanson	136	4.49E-05
27	Debbie Hedemann	128	6.46E-05
28	Linda Hester	136	4.67E-05
29	Merna Kin In	136	4.55E-05
30	B.J. Lemrah	137	4.24E-05
31	Kristen Leoma	130	5.38E-05
32	Barbara Legg	136	4.31E-05
33	Gail McLeod	136	4.18E-05
34	Lydia Pope	136	4.33E-05
35	Irma Rittmeister	137	4.21E-05
36	Debbie Sass	136	4.33E-05
37	Jill Terwilliger	134	4.86E-05
38	Alisa Vegas	139	4.31E-05
39	Loran Victorine	128	6.40E-05
40	Angela Walton	135	4.80E-05
41	Jodi Walton	142	4.18E-05
42	Pam Yamashita	134	4.80E-05
43	Hawaii Preparatory Academy, Kona	131	5.60E-05
44	Hawaii Preparatory Academy, S. Kona	128	6.27E-05
45	Henry Opukahaia School, Kona Campus	137	4.61E-05
46	Holualoa School	135	5.11E-05
47	Honaunau School	128	7.16E-05
48	Hookena School	120	7.93E-05
49	Kahaluu Elementary School	133	4.92E-05
50	Kau High & Pahala Elementary School	143	2.14E-03
51	Keaiakaha Elementary School	136	4.81E-05
52	Keaiakaha Intermediate School	136	4.81E-05
53	Kona Adventist School	128	6.58E-05
54	Konawaena Elementary School	129	6.15E-05
55	Konawaena High & Intermediate School	129	6.15E-05
56	Naalehu School	57	4.78E-04
57	Ocean View Estates School	79	1.50E-04
58	University of Hawaii	129	6.00E-05
59	University of the Nations	134	4.80E-05
60	Kau Hospital	147	2.42E-03
61	Kona Hospital	130	6.02E-05
62	Hillhaven Kona Healthcare Center	131	5.32E-05
63	Kona Adult Day Care Center	128	6.40E-05
64	Punaluu Restaurant	77	2.09E-03
65	Punaluu Condos	75	1.79E-03
66	Punaluu Beach Park	73	2.01E-03

Maximum occurs at Pahala Preschool and Kau Hospital 2.43E-03

Revised Table 5-1. UNIT RISK AND SLOPE FACTORS USED IN THIS ANALYSIS

Substance	Inhalation Unit Risk (µg/m3)-1	Inhalation Potency Value (mg/kg/day)-1	Oral Potency Value (mg/kg/day)-1
1,1-Dimethylhydrazine (UDMH)	4.90E-04	1.72E+00	
Hydrazine	4.90E-03	1.72E+01	3.00E+00
Nitrogen Dioxide (NO2)			
Formaldehyde dimethylhydrazine (FDH)	4.90E-04	1.72E+00	
Nitrosodimethylamine (DMNA)	1.40E-02	4.90E+01	5.10E+01

Revised Table 6-52. CANCER RISK DUE TO INHALATION OF UDMH RELEASED DURING A DEFLAGRATION EPISODE
(Inhalation Potency Slope Value for UDMH = 1.72 (mg/kg/day)-1)

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTDR.
1	Aloha Montessori Preschool	58	1.37E-08	1.96E-09	0.00E+00	1.96E-09	1.18E-08	1.96E-09	1.96E-09	1.57E-08
2	Creative Day Preschool Inc.	137	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
3	Keauhou Day Care - Kona	132	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
4	Head Start Kailua	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
5	Head Start Ka'u Home Base	58	1.37E-08	1.96E-09	0.00E+00	1.96E-09	1.18E-08	1.96E-09	1.96E-09	1.57E-08
6	Kamehameha Schools	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
7	Kona Baptist Kaildland	131	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
8	Kona Hongwanji Preschool	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
9	Moiliahiaua Church Nursery School	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
10	Pahala Preschool	143	1.78E-08	0.00E+00	0.00E+00	0.00E+00	1.57E-08	1.57E-08	5.88E-09	3.72E-08
11	Pali Uli Waldorf School	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
12	Salvation Army Chang Kalii Day Care Center	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
13	University of the Nations	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
14	Sherry Alves	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
15	Maiya Abaya	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
16	Trina Alapai	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
17	Joann Bishaw	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
18	Dawn Bradford	137	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
19	Kaiki Corner	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
20	Lucy Deleries	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
21	Cammy Featherstone	133	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
22	Nancy Fujimoto	133	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
23	Pat Gibson	138	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
24	Chris Hagerman	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
25	Kathy Lassere Harlan	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
26	Sandra Hansen	138	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
27	Debbie Hedemann	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
28	Linda Hesser	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
29	Merna Kin In	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
30	S.J. Lemnah	137	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
31	Kristen Leonna	130	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
32	Barbara Legg	138	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
33	Gail McLeod	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
34	Lydia Pope	138	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
35	Irene Rittmeister	137	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
36	Debbie Saito	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
37	Jill Terwilliger	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
38	Alisa Vegas	139	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
39	Loran Victorine	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
40	Angela Walton	135	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
41	Jodi Walton	142	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
42	Patti Yamashita	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
43	Hawaii Preparatory Academy, Kona Campus	131	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
44	Hawaii Preparatory Academy, South Kona	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
45	Harry Opukahaia School, Kona Campus	137	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
46	Holualoa School	135	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
47	Honaunau School	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
48	Hookena School	120	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	5.88E-09
49	Kahakai Elementary School	133	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
50	Kau High & Pahala Elementary School	143	1.96E-09	0.00E+00	0.00E+00	0.00E+00	1.78E-08	1.37E-08	5.88E-09	3.53E-08
51	Keaiakahe Elementary School	136	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
52	Keaiakahe Intermediate School	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
53	Kona Adventist School	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
54	Konawaena Elementary School	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
55	Konawaena High & Intermediate School	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
56	Naalehu School	57	1.37E-08	1.96E-09	0.00E+00	1.96E-09	1.18E-08	1.96E-09	1.96E-09	1.57E-08
57	Ocean View Estates School	79	3.92E-09	1.96E-09	0.00E+00	1.96E-09	3.92E-09	1.96E-09	1.96E-09	7.84E-09
58	University of Hawaii	129	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
59	University of the Nations	134	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
60	Kau Hospital	147	1.78E-08	0.00E+00	0.00E+00	0.00E+00	1.57E-08	1.57E-08	5.88E-09	3.72E-08
61	Kona Hospital	130	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
62	Hilltaven Kona Healthcare Center	131	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
63	Kona Adult Day Care Center	128	1.96E-09	1.96E-09	0.00E+00	1.96E-09	1.96E-09	1.96E-09	1.96E-09	3.92E-09
64	Punalau Restaurant	77	1.96E-08	0.00E+00	0.00E+00	0.00E+00	1.78E-08	1.37E-08	5.88E-09	3.33E-08
65	Punalau Condos	75	2.16E-08	0.00E+00	0.00E+00	0.00E+00	1.96E-08	1.18E-08	3.92E-09	3.14E-08
66	Punalau Beach Park	73	1.96E-08	0.00E+00	0.00E+00	0.00E+00	1.78E-08	1.37E-08	5.88E-09	3.33E-08

Maximum occurs at Pahala Preschool and Kau Hospital under Noctdrn scenario 3.72E-08

Revised Table 6-53. CANCER RISK DUE TO INHALATION OF FDH RELEASED DURING A DEFLAGRATION EPISODE
(Inhalation Potency Slope Value for FDH = 1.72 (mg/kg/day)-1)

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE: KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTDRN
1	Aloha Montessori Preschool	58	2.02E-10	2.11E-11	0.00E+00	4.70E-12	1.87E-10	3.52E-11	1.17E-11	2.89E-10
2	Creative Day Preschool Inc.	137	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
3	Keauhou Day Care - Kona	132	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.81E-11	2.82E-11	1.17E-11	2.98E-10
4	Head Start Kailua	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
5	Head Start Ka'u Home Base	58	2.02E-10	2.11E-11	0.00E+00	4.70E-12	1.87E-10	3.52E-11	1.17E-11	2.89E-10
6	Kamehameha Schools	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
7	Kona Baptist Keikiland	131	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.81E-11	2.82E-11	1.17E-11	2.98E-10
8	Kona Hongwanji Preschool	129	9.86E-11	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
9	Mokuaikaua Church Nursery School	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
10	Pahala Preschool	143	8.39E-11	0.00E+00	0.00E+00	0.00E+00	7.75E-11	6.58E-11	1.64E-11	2.30E-10
11	Pali Uli Waldorf School	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
12	Salvation Army Ohana Keiki Day Care Center	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
13	University of the Nations	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
14	Sherry Alves	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
15	Meija Abaya	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
16	Trina Alapai	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
17	Joann Bishaw	126	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
18	Dawn Bradford	137	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
19	Keiki Corner	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
20	Lucy Delarios	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
21	Cammy Featherstone	133	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
22	Nancy Fujimoto	133	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
23	Pat Gibson	139	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
24	Chris Hagerman	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
25	Kathy Leasose Hanlon	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
26	Sandra Hanson	138	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
27	Debbie Hedemann	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
28	Linda Hester	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
29	Mama Kin In	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
30	B.J. Lannah	137	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
31	Kristen Learne	130	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
32	Barbara Legg	138	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
33	Gail McLeod	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
34	Lydia Pope	138	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
35	Irma Rittmeister	137	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
36	Debbie Saito	138	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
37	Jill Terwilliger	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
38	Alice Vegas	139	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
39	Loren Victorino	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
40	Angela Walton	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
41	Jodi Walton	142	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.34E-11	2.82E-11	1.17E-11	2.98E-10
42	Pearl Yamashita	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
43	Hawaii Preparatory Academy, Kona Campus	131	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.81E-11	2.82E-11	1.17E-11	2.98E-10
44	Hawaii Preparatory Academy, South Kona	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
45	Henry Opukahaia School, Kona Campus	137	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
46	Holualoa School	135	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
47	Honaunau School	126	1.03E-10	2.11E-11	0.00E+00	7.05E-12	7.31E-11	2.82E-11	1.17E-11	2.98E-10
48	Hookena School	120	1.08E-10	2.11E-11	0.00E+00	7.05E-12	7.98E-11	2.82E-11	1.17E-11	2.98E-10
49	Kahakai Elementary School	133	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
50	Kau High & Pahala Elementary School	143	1.15E-10	0.00E+00	0.00E+00	0.00E+00	9.39E-11	6.34E-11	1.64E-11	2.40E-10
51	Kealakehe Elementary School	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
52	Kealakehe Intermediate School	136	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
53	Kona Adventist School	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.28E-11	2.82E-11	1.17E-11	2.98E-10
54	Konawaena Elementary School	129	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
55	Konawaena High & Intermediate School	129	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
56	Naalehu School	57	2.02E-10	2.11E-11	0.00E+00	4.70E-12	1.87E-10	3.52E-11	1.17E-11	2.89E-10
57	Oceanview Estates School	79	1.34E-10	1.88E-11	0.00E+00	7.05E-12	1.10E-10	2.82E-11	1.17E-11	2.98E-10
58	University of Hawaii	129	9.86E-11	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
59	University of the Nations	134	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
60	Kau Hospital	147	8.39E-11	0.00E+00	0.00E+00	0.00E+00	7.75E-11	6.58E-11	1.64E-11	2.30E-10
61	Kona Hospital	130	9.86E-11	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
62	Hillhaven Kona Healthcare Center	131	9.86E-11	2.11E-11	0.00E+00	7.05E-12	6.58E-11	2.82E-11	1.17E-11	2.98E-10
63	Kona Adult Day Care Center	128	1.01E-10	2.11E-11	0.00E+00	7.05E-12	7.05E-11	2.82E-11	1.17E-11	2.98E-10
64	Punaluu Restaurant	77	1.20E-10	0.00E+00	0.00E+00	0.00E+00	9.83E-11	6.11E-11	1.64E-11	2.42E-10
65	Punaluu Condos	75	1.41E-10	0.00E+00	0.00E+00	0.00E+00	1.13E-10	5.87E-11	1.41E-11	2.51E-10
66	Punaluu Beach Park	73	1.24E-10	0.00E+00	0.00E+00	0.00E+00	1.01E-10	6.11E-11	1.64E-11	2.44E-10

Maximum occurs at under Noctdrn condition 2.98E-10

Revised Table 6-55. OVERALL INHALATION CANCER RISK DUE TO RELEASE OF HYDRAZINE, UDMH, FDH, AND DMNA DURING A DEFLAGRATION EPISODE

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE: KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTDRN
1	Aloha Montessori Preschool	58	1.30E-07	3.34E-08	6.71E-11	1.25E-08	1.27E-07	2.30E-08	1.25E-08	1.52E-07
2	Creative Day Preschool Inc.	137	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
3	Keauhou Day Care - Kona	132	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
4	Head Start Kailua	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
5	Head Start Ka'u Home Base	58	1.30E-07	3.34E-08	6.71E-11	1.25E-08	1.27E-07	2.30E-08	1.25E-08	1.52E-07
6	Kamehameha Schools	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
7	Kona Baptist Keikiland	131	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
8	Kona Hongwanji Preschool	129	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
9	Mokuaikaua Church Nursery School	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
10	Pahala Preschool	143	2.16E-07	6.71E-11	6.71E-11	1.05E-08	1.94E-07	1.83E-07	6.87E-08	4.35E-07
11	Pali Uli Waldorf School	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
12	Salvation Army Ohana Keiki Day Care Center	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
13	University of the Nations	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
14	Sherry Alves	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
15	Meija Abaya	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
16	Trina Alapai	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
17	Joann Bishaw	126	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
18	Dawn Bradford	137	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
19	Keiki Corner	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
20	Lucy Delarios	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
21	Cammy Featherstone	133	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
22	Nancy Fujimoto	133	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
23	Pat Gibson	139	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
24	Chris Hagerman	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
25	Kathy Leasose Hanlon	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
26	Sandra Hanson	138	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
27	Debbie Hedemann	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
28	Linda Hester	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
29	Mama Kin In	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
30	B.J. Lannah	137	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
31	Kristen Learne	130	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
32	Barbara Legg	138	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
33	Gail McLeod	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
34	Lydia Pope	138	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
35	Irma Rittmeister	137	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
36	Debbie Saito	138	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
37	Jill Terwilliger	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
38	Alice Vegas	139	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
39	Loren Victorino	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
40	Angela Walton	135	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
41	Jodi Walton	142	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
42	Pearl Yamashita	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
43	Hawaii Preparatory Academy, Kona Campus	131	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
44	Hawaii Preparatory Academy, South Kona	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
45	Henry Opukahaia School, Kona Campus	137	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
46	Holualoa School	135	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
47	Honaunau School	126	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	3.56E-08
48	Hookena School	120	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	3.78E-08
49	Kahakai Elementary School	133	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
50	Kau High & Pahala Elementary School	143	2.29E-07	6.71E-11	6.71E-11	1.05E-08	2.06E-07	1.60E-07	5.82E-08	4.01E-07
51	Kealakehe Elementary School	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
52	Kealakehe Intermediate School	136	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	1.47E-08
53	Kona Adventist School	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	3.56E-08
54	Konawaena Elementary School	129	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
55	Konawaena High & Intermediate School	129	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
56	Naalehu School	57	1.30E-07	3.34E-08	6.71E-11	1.25E-08	1.27E-07	2.30E-08	1.25E-08	1.52E-07
57	Oceanview Estates School	79	3.35E-08	1.25E-08	6.71E-11	1.25E-08	3.35E-08	1.25E-08	1.25E-08	7.09E-08
58	University of Hawaii	129	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
59	University of the Nations	134	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
60	Kau Hospital	147	2.16E-07	6.71E-11	6.71E-11	1.05E-08	1.94E-07	1.83E-07	6.87E-08	4.35E-07
61	Kona Hospital	130	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
62	Hillhaven Kona Healthcare Center	131	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.25E-08	1.25E-08	1.25E-08	2.52E-08
63	Kona Adult Day Care Center	128	1.26E-08	1.25E-08	6.71E-11	1.25E-08	1.26E-08	1.25E-08	1.25E-08	2.52E-08
64	Punaluu Restaurant	77	2.39E-07	6.71E-11	6.71E-11	1.05E-08	2.16E-07	1.80E-07	5.82E-08	4.00E-07
65	Punaluu Condos	75	2.52E-07	6.71E-11	6.71E-11	1.05E-08	2.29E-07	1.37E-07	4.58E-08	3.66E-07
66	Punaluu Beach Park	73	2.39E-07	6.71E-11	6.71E-11	1.05E-08	2.18E-07	1.50E-07	5.82E-08	3.89E-07

Maximum occurs at Pahala Preschool and Kau Hospital under Noctdrn scenario 4.35E-07

Revised Table 6-69. CUMULATIVE IMPACTS OF CONFLAGRATION AND DEFLAGRATION: CANCER RISK

	ON-PAD CONFLAGRATION	DEFLAGRATION	CUMULATIVE
Pahala	0	4.3E-07	4.3E-07
Naalehu	0	1.5E-07	1.5E-07
Captain Cook	0	2.5E-08	2.5E-08

	CONFLAGRATION DURING VEHICLE ASCENT	DEFLAGRATION	CUMULATIVE
Pahala	0	4.3E-07	4.3E-07
Naalehu	0	1.5E-07	1.5E-07
Captain Cook	0	2.5E-08	2.5E-08

Revised Table 6-16. CANCER RISK DUE TO RELEASE OF UDMH BY AN ACCIDENTAL SPILL OF 816 GAL. OF UDMH FROM VEHICLE FUEL TANK UNDER VARIOUS WEATHER CONDITIONS
(Inhalation Unit Risk for UDMH = 4.90E-04 (µg/m3)-1)

WIND SPEED (m/sec)		2	4	2	2
POOL AREA (m2)		2328	466	2328	466
TIME OF DAY (hr)		1200	1200	0400	0400
Rec. #	Receptor Name	Wind Bearing			
1	Aloha Montessori Preschool	68	3.8E-06	1.9E-06	3.4E-06	4.3E-06
2	Creative Day Preschool Inc.	137	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3	Keauhou Day Care - Kona	132	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4	Head Start Kailua	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
5	Head Start Kona Home Base	68	3.8E-06	1.9E-06	3.3E-06	4.3E-06
6	Konaiwamoku Schools	128	0.0E+00	0.0E+00	0.0E+00	0.0E+00
7	Kona Baptist Kaililand	131	0.0E+00	0.0E+00	0.0E+00	0.0E+00
8	Kona Hongwanji Preschool	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
9	Mormonhaus Church Nursery School	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
10	Pahala Preschool	143	2.5E-06	1.0E-06	8.8E-06	1.0E-05
11	Pali Lil Wanderl School	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	Salvation Army Ohana Keiki Day Care Center	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
13	University of the Nations	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
14	Sherry Alves	128	0.0E+00	0.0E+00	0.0E+00	0.0E+00
15	Made Abaya	139	0.0E+00	0.0E+00	0.0E+00	0.0E+00
16	Trina Abaya	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
17	Jeanni Bahaar	128	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	Dawn Bradford	137	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	Keiki Corner	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	Lucy Delaries	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
21	Cathy Fonthanstone	133	0.0E+00	0.0E+00	0.0E+00	0.0E+00
22	Nancy Fujimoto	133	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	Pat Gibson	135	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	Chris Hagerman	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	Kathy Lakanen Hanlon	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
26	Sandra Hansen	138	0.0E+00	0.0E+00	0.0E+00	0.0E+00
27	Debbie Heidemann	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
28	Linda Hester	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
29	Marna Kin In	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	S.J. Lawrence	137	0.0E+00	0.0E+00	0.0E+00	0.0E+00
31	Kristen Lawrence	130	0.0E+00	0.0E+00	0.0E+00	0.0E+00
32	Barbara Legg	138	0.0E+00	0.0E+00	0.0E+00	0.0E+00
33	Gail McLeod	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
34	Lydia Pepe	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
35	Irene Rittenhouse	137	0.0E+00	0.0E+00	0.0E+00	0.0E+00
36	Debbie Sass	138	0.0E+00	0.0E+00	0.0E+00	0.0E+00
37	Jill Terwilliger	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
38	Alice Vegas	139	0.0E+00	0.0E+00	0.0E+00	0.0E+00
39	Lenon Victorino	128	0.0E+00	0.0E+00	0.0E+00	0.0E+00
40	Angela Walker	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
41	Jodi Walker	142	0.0E+00	0.0E+00	0.0E+00	0.0E+00
42	Pearl Yamashita	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
43	Hawaii Preparatory Academy, Kona Campus	121	0.0E+00	0.0E+00	0.0E+00	0.0E+00
44	Hawaii Preparatory Academy, South Kona	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
45	Harry Opukahaia School, Kona Campus	137	0.0E+00	0.0E+00	0.0E+00	0.0E+00
46	Hakalau School	138	0.0E+00	0.0E+00	0.0E+00	0.0E+00
47	Honaunau School	128	0.0E+00	0.0E+00	0.0E+00	0.0E+00
48	Hookena School	120	0.0E+00	0.0E+00	0.0E+00	0.0E+00
49	Kahaluu Elementary School	133	0.0E+00	0.0E+00	0.0E+00	0.0E+00
50	Kau High & Pahala Elementary School	143	2.1E-06	8.8E-06	8.5E-06	1.0E-05
51	Konawaena Elementary School	139	0.0E+00	0.0E+00	0.0E+00	0.0E+00
52	Konawaena Intermediate School	136	0.0E+00	0.0E+00	0.0E+00	0.0E+00
53	Kona Adventist School	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
54	Konaweana Elementary School	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
55	Konaweana High & Intermediate School	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
56	Naalehu School	57	3.8E-06	1.9E-06	3.4E-06	4.3E-06
57	Ocean View Estates School	76	1.4E-07	2.7E-07	3.4E-06	1.9E-06
58	University of Hawaii	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
59	University of the Nations	134	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	Kau Hospital	147	2.5E-06	1.0E-06	9.5E-06	1.9E-06
61	Kona Hospital	130	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	Hilltown Kona Healthcare Center	131	0.0E+00	0.0E+00	0.0E+00	0.0E+00
63	Kona Adult Day Care Center	129	0.0E+00	0.0E+00	0.0E+00	0.0E+00
64	Punaluu Restaurant	77	2.0E-06	8.5E-06	6.4E-06	1.6E-05
65	Punaluu Condos	75	1.7E-06	7.3E-06	7.7E-06	1.4E-05
66	Punaluu Beach Park	73	1.9E-06	6.1E-06	8.2E-06	1.3E-05
	Maximum occurs at Pahala Preschool and Kau Hospital under nighttime light wind situation, pool area = 2328 m2		9.5E-06			

1993

JOHN WAIHEE
GOVERNOR OF HAWAII

Keith W. Ahue, Chairperson
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
John P. Keppeler, II
Dona L. Hanaike

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SKK

File No.: 94-093
DOC. ID.: 3843

DEC 8 1993

MEMORANDUM

TO: Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control

FROM: KEITH W. AHUE, Chairperson
Board of Land and Natural Resources

SUBJECT: Draft Environmental Impact Statement (DEIS): Commercial Satellite Launching Facility, Palima Point, Ka'u, Hawaii, TMKs: 9-6-02: pors. 1-6, 9, 10, 20, 28, 47-49; 9-6-13: pors. 3, 5, 6

We have reviewed the DEIS information for the proposed subject project transmitted by your letter dated on August 10, 1993, and have the following comments:

Division of Aquatic Resources

The Division of Aquatic Resources (DAR) comments that the DEIS's discussion of "routine operational" impacts on aquatic biota is limited to unspecified "biota residing" in anchialine ponds (4.III.B.7.0) and sea turtles (4.III.B.8.0). This limitation is clearly inadequate: the EIS should address potential for impacts on other marine organisms, including planktonic and larval forms in nearshore waters, corals, seaweeds (limu), crustaceans and nearshore marine finfish.

The DEIS indicates 60,000 gallons of water would be used for each launch "for sound suppression and pad wash down" (4.III.C.1.0), without discussing potential toxicity of the "used" water, how the wastewater would be disposed, or what effects such disposal might have. The EIS should cover these aspects.

The DEIS (5.I.C) describes models used to evaluate potential effects of "ROCKET EXHAUST AND LIQUID SPILLS:" "REEDM" to assess impacts of exhaust substances diffused in the air, and "AFTOX" to predict behavior of liquids spilled on the ground. The DEIS mentions impact of airborne toxic substances from fuel and exhaust during normal launches on terrestrial biota (5.III.D.3.0), but fails to discuss (a) toxins released into the air and washed by rain into coastal waters, and (b) any impact on aquatic organisms.

Local newspapers have reported allegations that such toxic substances from launches at the Kennedy Space Center have destroyed significant areas of coral reef near Cape Canaveral, Florida. The DEIS proposes no aquatic animals other than sea turtles among the "Sensitive Ecological Receptors" (indicator species) for assessing ecological risk (5.III.D.3.0).

The scope of EIS should be expanded to discuss the effects of toxic substances either washed into or deposited from the atmosphere, into anchialine and marine ecosystems. The EIS should propose anchialine and marine species to serve as indicators of toxic pollution. The EIS should explain and document claims such as, "By virtue of coastal area closure, the Cape Canaveral launch facility in Florida has become an important wildlife preserve..." (4.III.B.8.0).

The CONCEPTUAL SHORELINE ACCESS MANAGEMENT PLAN states that a single gate and road with a 24-hour guard would constitute the sole public access to approximately eight miles of shoreline (Nahuluhulu Point to the north side of Kapaoo Point) and "lateral access" would be allowed along the shoreline (necessarily on foot since there are no roads). Figure II-4.2 shows three public parking lots (capacities not specified): lots at Kamehame Beach and Wai a Pele Bay would also have rest rooms and drinking water, the lot near Palima Point would not. The Plan indicates that access would be allowed between 6:00 a.m. and 6:00 p.m. "except during launch periods" (of unspecified duration). DAR believes that this represents indefinite promises that "it is possible that some time in the future, fishermen might be able to obtain overnight permits" (IV.B.3.0), and of "possible night fishing by permit only" (IV.B.4.0.), "fishermen who hold special overnight permits may be allowed [to camp overnight]" (IV.B.5.0). Facilities would be built and maintained by the developer; access would be controlled by securty staff working for the Authority or "operator."

"Proposed" and "possible" precautionary measures to protect environmental values, and human benefits therefrom, should be mandatory conditions of any permits issued for the project:

- All areas where fuels and any other toxic or hazardous materials are stored or handled should be required to be constructed such that spills will be "completely contained" (III.B.6.0), and an acceptable plan for neutralizing, detoxifying and cleaning up such materials should be adopted prior to any use of any facility at the site;

- Monitoring of toxin concentrations in soils, ground water and coastal waters should be required, bimonthly during construction and (at least quarterly) during at least the first five years of operations (loc. cit.), with results of water quality monitoring required to be reported quarterly to the State's authorities responsible for water quality;

- Monitoring of biological diversity and standing crops in anchialine and coastal habitats (loc. cit.) should be required. Baseline values should be determined before construction begins and continued at quarterly intervals during construction and the first five years of operation. The results of biological monitoring should be required to be reported quarterly to the State's authorities responsible for biological resources;

- A plan for lighting, acceptable to the National Marine Fisheries Service and U.S. Fish and Wildlife Service (III.B.8.0), should be required, implemented and monitored to ensure against impacts detrimental to sea turtle breeding and hatching;

- Provisions for adequate public access to coastal resources of the site, reviewed and agreed upon by appropriate representatives of the local community (such as the Hawaii County Aquatic Life and Wildlife Advisory Committee) should made.

Division of Forestry and Wildlife

The Division of Forestry and Wildlife's (DOFAW) primary concern regarding this project is the inevitable adverse impact that the proposed project would have on the trails and access to and along the coastline area. DOFAW questions the merits of pursuing the development of the facility which has drawn so much public opposition, particularly from the local population. There is no denying the major impact the project would have on the community if implemented.

Division of Land Management

The Division of Land Management (DLM) comments that two (2) of the sixteen (16) parcels of land being proposed for inclusion in the commercial satellite launching facility at Palima Point, Ka'u, Hawaii are owned in fee simple by the State of Hawaii. These State-owned parcels are identified by Tax Map Keys (TMK): 9-6-02: 5 and 10, and are within the Agricultural District as designated by the State Land Use Commission.

A State-owned parcel identified by TMK: 9-6-02: 5, is encumbered under a month-to-month Revocable Permit No. S-6581 to Ka'u Agribusiness Company, Inc. and Kawaihae Ranch. The other State-owned parcel, identified by TMK: 9-6-02: 10 is unencumbered and vacant.

Before the State-owned parcels may be utilized for commercial satellite launching facility purposes, the following requirements must be fulfilled:

1. Compliance with all applicable sections of Chapter 343, Hawaii Revised Statutes, as amended, relating to Environmental Impact Statements;

2. Land disposition approval from the State Board of Land and Natural Resources.

We have no other comments to offer at this time. Thank you for the opportunity to comment on this matter.

Please feel free to call Steve Tagawa of our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

cc: Takeshi Yoshihara, DBED&T
[redacted]

JOHN WAIHEE
GOVERNOR OF HAWAII

1993

1) KKM
2) RF

COPY

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 8TH FLOOR
HONOLULU, HAWAII 96813

KEITH AHUE, [redacted]
BOARD OF LAND AND NATURAL RESOURCE

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AQUACULTURE DEVELOPMENT PROGRAM
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HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

September 7, 1993

LOG NO: 9406
DOC NO: 9309RC12

Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: **Draft EIS, Conceptual Plan Commercial Satellite Launching Facility at Palima Point (DBEDT)**
Multiple, Ka'u, Hawai'i

The proposed launch facility includes three launch pads near the shore in the Palima Point area; associated support facilities and infrastructure located inland, and a road system (cf. Fig. II-1.2, Conceptual Facilities Plan).

Only one of the proposed project areas has received an archaeological inventory survey to determine if significant historic sites are present and, if so, how to treat those sites. This area is the immediate shoreline around the three proposed launch pads. An acceptable archaeological inventory survey report has yet to be received by our Division. The report presented in the Draft EIS has not been accepted. This report has been revised once and needed some additional relatively minor revisions. However, until the revised report is received, we cannot finalize the significance evaluations for the historic sites along the Palima Point coast in the proposed immediate launch area. Thus, the significance evaluations presented in Chapter 7 of the Draft EIS have not yet been accepted by our Division, nor have the mitigation recommendations -- although something relatively similar is likely to be accepted. Additionally, until an acceptably revised report is received, the public will not have an accurate report of the findings.

The findings of the survey in the launch pad area, based on current information, indicates 138 historic sites, of which 93 appear to be significant. Minimal permanent habitation was along this coast, perhaps due to the fact that this was a high lava flow area. The only major concentration of permanent prehistoric habitation is near Palima Point. DBEDT's consulting archaeological firm recommended interpretive preservation of this complex. Our Division finds this recommendation acceptable, particularly since no coastal habitation cluster is preserved in this vast stretch of eastern Ka'u. As we noted in an August 9, 1993, memo to DBEDT, this preserve enters into the central launch circle as currently drawn. Also, it appears that some additional sites will need to be added to the preserve, as well as a buffer zone to preserve the complex's visual and physical setting. This would require the proposed launch pad to be moved somewhat. Also, such a preserve would be intended in part as a benefit for public education, and this would require public access in some form and interpretation. (We should note that other sites will also be recommended for preservation, including the major coastal trail with traditional cultural significance and

access rights concerns.) The Draft EIS does not address these concerns of preservation effectively. The note on page S-11 that an explosion on a pad could damage nearby sites is also rather disturbing. This statement makes it seem likely that an even larger buffer zone around this complex would be needed, probably requiring the movement of the proposed central pad even farther away.

The project areas inland (support structures) and roads, and any new area for the central pad if moved slightly inland, have not undergone archaeological inventory survey. Brief reconnaissance studies and predictive studies indicate that historic sites are likely to be in these areas, albeit in low densities. Several large burial complexes are known to be in such inland areas. DBEDT's consulting archaeological firm recommended in their coastal survey report's conclusions that archaeological inventory survey of the inland areas occur prior to planning project elements in this area. Our Division agrees with this finding. It is the only reasonable approach to proper planning for impacts to significant historic sites. Several years ago in meetings with the Office of Space Industry, our Division indicated that such surveys would be needed for infrastructure impact areas in order for acceptable compliance with the State's historic preservation law, Chapter 6E, H.R.S. We must conclude that compliance has yet to occur for the proposed infrastructure areas. Rather than treat this as an unresolved issue to occur later prior to design and construction, it would be far better to address this planning concern now.

Last, we should note that we are not in total agreement with the comments on the Cultural Resources related to Hawaii Volcanoes National Park (p. 7-29). The division between sites within the park and this launching facility area are not as distinct as portrayed. We had made several comments to the consulting archaeologist on this matter in our last review of the coastal archaeological survey.

In sum, at this point, we must conclude that several deficiencies exist with this draft conceptual plan. The survey report of the shoreline area has yet to be fully accepted, and preservation concerns will require some redesigning of launch pad areas. The other impact areas of the proposed facility have yet to undergo archaeological inventory survey, so it is not possible to determine if they will impact significant historic sites and, if so, if suitable mitigation measures are planned. This is a concern because several sizable burial sites are in the inland area, and more could be present. Mitigation planning also needs to involve the native Hawaiian community prior to finalizing mitigation commitments. These are unresolved issues that should be resolved now, rather than later.

Sincerely yours,

DON HIBBARD, Administrator
State Historic Preservation Division

RC:amk

c: Takeshi Yoshihara, Dept. Business, Economic Development & Tourism

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
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SEP. 30 1994

MEMORANDUM

TO: The Honorable Keith Ahue
Chairperson, Board of Land and Natural Resources
Department of Land and Natural Resources

FROM: Takeshi Yoshihara

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Thank you very much for your comments on the subject dEIS. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. If a specific project advances, a supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Attachments

Cultural Surveys Hawaii, Risk Science Associates and Dr. Richard Brock contributed to the following responses.

The following comments are from the Historic Preservation Division (HPD). The responses also incorporate their September 7, 1993:

Comment: *Only one of the proposed project areas (the shoreline launch pad area) has received an archaeological inventory survey to determine if significant historic sites are present and, if so, how to treat those sites. The report presented in the Draft EIS has not been accepted by the Historic Preservation Division. Until the revised report is received, the significance evaluations cannot be finalized for the historic sites along the Palima Point coastline. Additionally, until an acceptably revised report is received, the public will not have an accurate report of the findings.*

Response: All suggested revisions requested by the Historic Preservation Division (HPD) after their pre-publication review were incorporated into the document that was published in the dEIS. The second set of revisions was requested after the document was published. We understand that the consultant has completed these relatively minor additional revisions to the report, however, the report will not be published at this time due to cost consideration. Should an actual project be proposed, historic preservation issues will be revisited. At that time, after a more definitive project description and site layout is available, the scope of additional inventory surveys on the property will be developed in coordination with HPD.

Comment: *The findings of the survey in the launch pad area indicates the only major concentration of permanent prehistoric habitation is near Palima Point. Interpretive preservation of this complex is recommended. Our Division finds this recommendation acceptable, particularly since no coastal habitation cluster is preserved in this vast stretch of eastern Ka`u. As we noted in an August 9, 1993 memo to DBEDT, this preserve enters into the central launch circle as currently drawn. Also, it appears that some additional sites will need to be added to the preserve, as well as a buffer zone to preserve the complex's visual and physical setting. This would require the proposed launch pad to be moved somewhat. Also, such a preserve would be intended as a benefit for public education, and this would require public access in some form and interpretation. The DEIS does not address these concerns of preservation effectively. The note on page S-11 that an explosion on a pad could damage nearby sites is also rather disturbing. This statement makes it seem likely that an even larger buffer zone around this complex would be needed, probably requiring the movement of the proposed central pad even farther away.*

Response: The "central circle" is primarily open space--a safety buffer zone. If an actual project is proposed, historic preservation concerns will be addressed during the facility location process. A supplemental EIS will also be prepared for the actual

project. Public access and interpretation considerations for the historical preserve were discussed in the Conceptual Shoreline Management Plan (DEIS Volume I, Chapter Two and Appendix XF). The draft Plan states that further coordination among others (including Historic Preservation) is required before the plan is adopted.

Comment: *The project areas inland (support structures) and roads, and any new area for the central pad if moved slightly inland, have not undergone archaeological inventory survey. Brief reconnaissance studies and predictive studies indicate that historic sites are likely to be in these areas, albeit in low densities. Several large burial complexes are known to be in such inland areas. DBEDT's consulting archaeological firm recommended in their coastal survey report's conclusions that archaeological inventory survey of the inland areas occur prior to planning project elements in this area. Our Division agrees with this finding. We must conclude that compliance with Chapter 6E, HRS, has yet to occur for the proposed infrastructure areas. Rather than treat this as an unresolved issue to occur later prior to design and engineering, it would be far better to address this planning concern now.*

Response: Early during the planning process for this project (and in consultation with the Historic Preservation Division), it was decided to define an impact band which included the three launch pads and an extensive buffer zone which included a radius mauka of the center of each launch pad, as well as the entire coastal zone between all launch pads. An archaeological survey of the entire population control zone at that point would have been unmanageable, prohibitively costly (at taxpayer expense), and time consuming because of the vast area involved. It was known from the beginning that there would be other areas to be impacted within the population control zone, specifically the sites of support facilities, roads, and other improvements. Because the exact locations of these facilities are not known, it was not feasible to survey these areas at this time. It was always understood that all areas to be impacted would be subject to archaeological inventory survey and mitigation when their locations were defined. We agree with the comments recommending inventory survey of all these areas before impact, as many sites are known to be in the inland areas although they are widely dispersed.

Comment: *We are not in total agreement relating to Hawaii Volcanoes National Park (p.7-29). The division between sites within the park and the launching facility area are not as distinct as portrayed.*

Response: The archaeological survey of the coast has shown that archaeological sites and Hawaiian habitation are clustered in areas where there is access to the coast. The survey has also shown that archaeological sites within the 1823 lava flow, which covers much of the National Park boundary area is nearly devoid of archaeological sites, except in kipuka areas not covered by this flow. Both of these factors contribute to the existence of an archaeological barren zone within a half mile or more on either side of the National Park boundary (both inside and outside of the park). As stated in the archaeological report, the nearest archaeological sites within the park boundary lie approximately 7000 feet from the nearest habitation sites along the coast west of the park boundary (the Punahaha lava tube complex).

It is true that the 1823 lava flow could have covered archaeological sites and that these areas could once have been connected by continuous sites. We will never know the answer to this question. The settlement pattern showing habitation clustered in areas with access to the coast, however, and absence of sites in steep cliff areas (characteristic of the National Park boundary area) indicate what has always been a barren area, even before the 1823 lava flow.

For these reasons, the conclusions reached in Volume IV are still thought to be valid. The conclusions, however, are based upon spatial (topographic and geographic) relationships. The more difficult question of cultural relationships between these spatially separated areas is not addressed. There probably was prehistoric and early historic contact between coastal settlements, which extended mauka/makai, as well as parallel to the coast via canoe transportation, and along coastal trails.

The following comments are from the Division of Aquatic Resources (DAR):

Comment: *The DEIS's discussion of 'routine operational' impacts on aquatic biota is limited to unspecified "biota residing" in anchialine ponds (4.III.B.7.0) and sea turtles (4.III.B.8.0). This limitation is clearly inadequate: the EIS should address potential for impacts on other marine organisms, including planktonic and larval forms in nearshore waters, coral, seaweeds (limu), crustaceans and nearshore marine finfish.*

Response: The potential impacts to nearshore marine species are covered in DEIS Appendix IIIE (pages 47 through 53). The request for a discussion of impacts to plankton and larval forms is unusual (most dEIS's do not cover this subject area). No fieldwork was carried out examining planktonic communities in the waters fronting Palima Point, therefore site specific information is not available. The oceanic nature of this coastline, however, suggests that planktonic communities are a mix of both nearshore and offshore organisms; the nearshore complex probably comprised primarily of larval forms and the offshore component holoplankton.

Preliminary analysis of impacts to nearshore (adult) marine communities suggests that impacts attributable to launch facility construction and operation would be minimal, due in part, to the rapid dilution and flushing that occurs in these nearshore waters. If this preliminary analysis is correct, it follows that the plankton residing in the nearshore water column would be similarly unaffected.

With respect to the toxicity of materials on plankton communities, it should be realized that the organic contaminants that are released by the launch vehicles are not bioaccumulated and that aluminum released into the environment is not a foreign substance in Hawaii; significant aluminum exists in Hawaiian soils (especially on Kauai in the form of bauxite).

A thorough and complete response to such a broad comment would require a major research project of several years duration with no guarantee that data would be produced to address each and every species of concern. The US EPA recognizes the limits of human and ecological risk assessment and the lack of a complete and uniform ecotoxicological

data base and therefore recommends the use of surrogate species and indicator chemicals. Thus, while it is true that the Ecological Risk Assessment addressed only certain avian and mammalian species, these species would be the most heavily exposed and thus were at greater risk. Several facts, however, point to the probability that impacts on marine ecosystems will be negligible:

* Vast dilution of contaminants by rainfall and ocean waters will occur.
* The organic substances released are not bioaccumulated or bioconcentrated.
* The emissions of acidic compounds from launch vehicles pale in comparison to the releases during volcanic eruptions.
* The presence of naturally occurring aluminum in volcanic soil is significantly greater than what could ever be deposited by launch vehicles.

Comment: *The dEIS indicates that 60,000 gallons of water would be used for each launch "for sound suppression and pad wash down", without discussing potential toxicity of the "used" water, how the wastewater would be disposed, or what effects such disposal might have. The EIS should cover these aspects.*

Response: Launch pads at Cape Canaveral and Vandenberg are designed to channel pad washdown water into concrete trench holding ponds for subsequent treatment and disposal. The water is contained until tested and treated to insure compliance with surface water quality standards. If an actual project is planned, launch pad(s) would be designed for the particular launch vehicle and most likely would include a washdown water containment and treatment feature. A supplemental environmental impact statement would be prepared that identifies the design features and water requirements for the specific vehicle(s) assessed.

Washdown water is expected to be very low in toxicity and could be used for landscape irrigation after treatment. No adverse environmental impacts are anticipated, as water used for landscape irrigation would meet State Department of Health minimum purity requirements for such purposes. Any wastewater that cannot be neutralized or that does not meet minimum purity requirements would be disposed of by a certified contractor in accordance with EPA regulations.

Comment: *The DEIS mentions impact of airborne toxic substances from fuel and exhaust during normal launches on terrestrial substances from fuel and exhaust, but fails to discuss (a) toxins released into the air and washed by rain into coastal waters, and (b) any impact on aquatic organisms. Local newspapers have reported allegations that such toxic substances from launches at Kennedy Space Center have destroyed significant areas of coral reef near Cape Canaveral, Florida. The DEIS proposes no aquatic animals other than sea turtles among the "Sensitive Ecological Receptors" (indicator species) for assessing ecological risk.*

The scope of the EIS should be expanded to discuss the effects of toxic substances either washed into or deposited from the atmosphere, into anchialine and marine ecosystems. The EIS should propose anchialine and marine species to serve as indicators of toxic pollution.

Response: Two airborne compounds resulting from the burning of solid propellant are potentially hazardous if inhaled by humans or animals. These are hydrogen chloride and aluminum oxide. The impacts assessed in the dEIS were assumed to occur with the development of a transient gas cloud formed by burning of the propellant.

The binding of particulate materials with water (as in rain) dilutes the material and eliminates direct intake into the lungs of air breathing species. Contaminated rain percolating through the porous lava towards the groundwater may allow binding or adsorption of contaminants to the rock or be carried to the groundwater. In both cases, dilution of the material would occur. If the contaminated rain falls directly on the ocean, dilution also occurs. Assessment of the impact of these materials on aquatic biota is difficult without knowledge of the toxicity of these compounds on a wide range of aquatic species, compound solubility as well as the input and dilution rates of these materials into an essentially open ocean marine setting.

It is difficult to respond to newspaper allegations that are not included with the comment, however, there are distinct differences between Kennedy Space Center (KSC) and the proposed for Palima Point project site. Notably, the water depth and circulation at Palima Point is much greater than at KSC. In addition, the Space Shuttle produces approximately 200 times more hydrogen chloride than a Delta II. The high production of hydrogen chloride--combined with the water used to suppress sound--has resulted in precipitation which has created temporary, localized increases in ocean acidity. As noted in Volumes VII and VIII, this is not expected to occur in the case of the proposed Palima Point project. It should also be recognized that the organic contaminants released by launch vehicles are not bioaccumulated or bioconcentrated (RSA, DEIS Volume VIII). In addition, aluminum is far more prevalent than most people realize in Hawaiian (volcanic) soils. There are significant deposits of aluminum (bauxite) on Kauai and with no discernible biological effects.

The ocean fronting Palima Point is very rough and exposed to the NE trades. Any pollutant reaching the ocean either via an "on-land" accident or from normal launch operations would be very rapidly diluted just because of the rough nature of the ocean in the area. Additionally, one should note that water depth increases rapidly along the coast from the shore. The "shelf" where hermatypic corals are found (the usual corals of coral reefs which are normally restricted to water less than 200 ft. deep) is within 100 yards of shore along much of the area; in other words, normal coral reef communities are restricted to a very narrow band along most of this coast and open ocean conditions exist right up to the shore. Thus with surface or shore line input, the benthic (bottom) communities would probably have little if any opportunity for exposure to any pollutant coming into the system at the surface or carried in by groundwater.

As stated in Volume III, Appendix E of the dEIS:

"The potential input to groundwater at the proposed Palima Point launch facility would be through the spillage of liquids used in launching rockets. The porous nature of the natural lava would probably allow spilled materials to quickly reach the water table just a few meters beneath the surface in the vicinity of the coastal launch pads. Toxicity of anthropogenic materials to organisms residing in the groundwater or anchialine pools is essentially unknown; however, statistically significant increases in inorganic fertilizers (from treated sewage and dry fertilizers) on the Kona coast have had no quantitatively definable impact to these biota despite more than 7 years of monitoring (Brock and Kam 1992).

The assumption is made that any spilled materials would be toxic to the biota both residing in the groundwater and the anchialine pool on the project site as well as to nearshore marine biota. Qualitatively there appears to be a large groundwater input along much of the shoreline in the vicinity of the launch pads suggesting that spilled materials would quickly be delivered to the sea. Toxicity is a function of concentration; as soon as any material reaches the groundwater, concentration is declining. Once in the ocean the mixing processes are enhanced suggesting that a potentially harmful spill may not have the impact as first imagined. Nevertheless, to insure that spilled materials do not reach the groundwater, it is recommended that all areas where such materials are handled be completely contained and built to capture and reclaim any material that may be accidently spilled."

Without specifics as to the materials, their solubility, the volume, the location of the spill, the rate of groundwater flow through the spill area to the sea, an accurate depiction of near shore currents and some knowledge about the toxicity of the materials to a wide range of species, any quantitative statement beyond that given above in the DEIS is impossible. It is also doubtful that additional quantitative analysis would give a different conclusion.

In summary, the Palima Point coastline has a relatively large groundwater input to the sea which would serve to carry any land borne pollution that reaches the coastal groundwater to the ocean. The Palima Point coastline is very exposed and open ocean conditions occur up to the shoreline. The bottom topography is very steep, rapidly dropping away to great depths within 100m of shore. Preliminary studies suggest that these conditions create a situation that any pollutant either entering the groundwater and on to the sea or into the sea directly, would be rapidly diluted and avected out of the area.

The study of the aquatic biota of the area was a preliminary effort; the data to date suggest that the coastal marine communities are dominated by high energy waves impinging on a very exposed coast resulting in poor coral community development. Because of the steep submarine topography, many other shallow water community elements are likewise poorly developed. To make a more in-depth assessment of impacts to marine biota a consider able greater body of basic information would be necessary. As noted above, without specifics as to the materials, their solubility, the volume, the location

of the input, the rate of groundwater flow through the spill area to the sea (if applicable), an accurate depiction of nearshore currents and some knowledge about the toxicity of the materials to a wide range of species, any quantitative statement about the actual impact is impossible to make. It should be noted, however, that our preliminary analysis suggests that if a spill were to occur and the material was not contained, toxic impacts would be minimal due to dilution and avection due to the (1) the apparent large flow of groundwater in the area, and (2) the high energy nature of the ocean fronting the project site. To reiterate, because there is no available eco-toxicological data on the potential effects of exposure of most aquatic species to the kinds of contaminants under consideration here, we would expect that routine monitoring of the air, groundwater and nearshore water for these contaminants would be an acceptable part of the overall management program for the launch facility.

Comment: *The EIS should explain and document claims such as, "By virtue of coastal area closure, the Cape Canaveral launch facility in Florida has become an important wildlife preserve."*

Response: The area immediately adjacent to Cape Canaveral is a wildlife preserve because residential and commercial land development has been restricted and the marsh habitat preserved. Merritt Island Wildlife Refuge in Florida (which is part of Kennedy Space Center/Cape Canaveral Complex), is an estuarine system that is host to many species. Similarly, at Vandenberg Air Force Base, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds. As noted in Appendix IIID of the dEIS:

"...Human activities such as urban and industrial development, dredging and commercial fishing potentially pose a threat to turtle populations and their habitat ...It is the destruction or modification of beaches that has had the greatest impact on the ability of turtle populations to sustain their numbers."

Large open space areas at launch facilities that are restricted for safety reasons, where human activities and industrial development are not allowed, are features of Cape Canaveral and Vandenberg AFB. The open spaces provide valuable habitat for endangered sea turtles, alligators, and many bird species.

It is also stated in Volume III, Appendix D, that:

"Sea turtles nest on the beaches of Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success...lighting procedures are inspected by the U.S. Fish and Wildlife service for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill...it is suggested that a light management plan similar to Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built."

Comment: *The CONCEPTUAL SHORELINE ACCESS MANAGEMENT PLAN states that a single gate and road with a 24-hour guard would constitute the sole public access to approximately eight miles of shoreline. Figure II-4.2 shows three public parking lots (capacities not specified); lots at Kamehame Beach and Wai a Pele Bay would also have rest rooms and drinking water, the lot near Palima Point would not. The Plan indicates that access would be allowed between 6:00 am and 6:00 pm "except during launch periods" (of unspecified duration). DAR believes that this represents indefinite promises that "it is possible that sometime in the future, fishermen might be able to obtain overnight permits" etc. Facilities would be build and maintained by the developer; access would be controlled by security staff working for the Authority or "operator."*

Response: As stated on page 1 of Appendix XF, the Conceptual Shoreline Access Management Plan is just that, conceptual:

> *"...the final plan will not be adopted until after extensive public and agency comment and review. Finalization of all the elements of the plan will be closely coordinated with the Department of Land and Natural Resources (DLNR) and the County of Hawaii."*

If an actual project is developed, specific points such as those raised above would be resolved by public comment and coordination with DLNR and the County of Hawaii. In addition, it should be noted that at the present time there is no public vehicle access to the shoreline area of the site. Locked gates prevent entry to the jeep trails on the site. Access is by foot from Punalu`u or Hawaii Volcanoes National Park. The Conceptual Shoreline Management Plan is a first attempt at providing public shoreline access while still protecting public health and safety.

Comment: *"Proposed" and "possible" precautionary measures to protect environmental values, and human benefits therefrom, should be mandatory conditions of any permits issued for the project.*

Response: We are in agreement with this comment; however, because of the comments we have presented in the previous response, we believe that emphasis in the monitoring program should be placed on water chemistry studies. Biological monitoring should also occur but the frequency should probably be less intense due to the logistical problems mentioned above. Again, a monitoring program could be a condition of any governmental permit issued for the project if it were to proceed.

Finally, we recognize and agree with the DLNR that if the project were to proceed, a comprehensive monitoring program should be in place to insure that the integrity of air, ground and nearshore marine waters and communities are not compromised. As a final point, it should be remembered that the assessment of marine communities in this study was a preliminary effort; we would expect that further work would be carried out if the project were to proceed. It follows that with more information, analysis of impacts would be refined. We do not believe, however, that the conclusions would change much as additional information became available.

The following are responses to comments received from the Division of Forestry and Wildlife.

Comment: *The Division of Forestry and Wildlife's (DOFAW) primary concern is the inevitable adverse impact that the proposed project would have on the trails and access to and along the coastline area. DOFAW questions the merits of pursuing the development of the facility which has drawn so much public opposition, particularly from the local population. There is no denying the major impact the project would have on the community if implemented.*

Response: As stated in the Volume II of the dEIS (page 7-29):

> *"The facility could...indirectly encourage greater recreational use of the shoreline...by providing recreational support facilities, such as drinking water."*

Currently site access is restricted by a series of locked gates. Traditional Hawaiian trails, particularly along the coastline, would most likely be preserved as recommended by the Historic Preservation Division.

The dEIS presents information to the public so that the reader may determine whether the merits of pursuing the development of the facility offset the potential impacts. The acceptability of the project is left to be decided by the legislative and regulatory bodies and the community.

Responses to Comments from the Division of Land Management.

Comment: *The Division of Land Management (DLM) comments that two of the sixteen (16) parcels of land being proposed for inclusion in the commercial satellite launching facility are owned in fee simple by the State of Hawaii. These State-owned parcels are within the Agricultural District as designated by the State Land Use Commission.*

Before the State-owned parcels may be utilized for commercial satellite launching purposes, the following requirements must be fulfilled:

- *Compliance with all applicable sections of Chapter 343, Hawaii Revised Statutes, as amended, relating to Environmental Impact Statements;*
- *Land disposition approval from the State Board of Land and Natural Resources.*

Response: Please note that Volume II, page 10-7, has included the above requirements in the Table of Applicable Reviews, Permits, and/or Approvals.

JOHN WAIHEE
GOVERNOR

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
JOYCE T. OMINE
AL PANG
CALVIN M. TSUDA

IN REPLY REFER TO:

STP 8.5592

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

November 9, 1993

TO: The Honorable John Waihee, Governor
c/o Office of Environmental Quality Control

FROM: for Rex D. Johnson
Director of Transportation

SUBJECT: Draft Environmental Impact Statement (DEIS) Commercial Satellite Launching Facility, TMK: 4-6-02: Por. 01-06, 10, 20, 28, 442-49 and 9-6-13: Por. 03, 05, 06

We have reviewed Volume V of the DEIS for the proposed Commercial Satellite Launching Facility in Ka'u and offer the following comments:

1. The developer should minimize traffic impacts to State highways during construction of the proposed project.

2. The traffic study should discuss impacts to pedestrians and bicyclists and include level-of-service calculations.

3. The launching facility should have a fully channelized intersection where it accesses onto our facility.

4. The excavation plan should be reevaluated since it is questionable that 510 vehicles could depart the launching site in 3 minutes given the assumed conditions.

5. Construction plans for work within the State highway right-of-way must be submitted for our review and approval. Required improvements must be provided at no cost to the State.

We appreciate this opportunity to provide comments.

c: [redacted]

12-77

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN W.
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SEP. 30 1994

MEMORANDUM

TO: The Honorable Rex D. Johnson
Director of Transportation
Department of Transportation

FROM: Takeshi Yoshihara

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Thank you very much for your comments on the subject dEIS.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. If a specific project advances, a supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

In response to your specific comments, facilities and access roads are only conceptual at this time. More detailed studies (including consideration of pedestrians and bicyclists), and level-of-service calculations, will be prepared if and when an actual project is designed. Construction plans for work within the State highway right-of-way will be submitted for review and approval.

Thank you again for taking the time to comment on the dEIS.

. . . E , 1993

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813-5249
PHONE (808) 586-3777
FAX (808) 586-3799

November 22, 1993

Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King St., Suite 400
Honolulu, HI 96813

Dear Sir:

We have reviewed the State Draft Environmental Impact Statement for the Commercial Satellite Launching Facility at Palima Point, Kau, Hawaii. Enclosed you will find a copy of a report outlining our response to the proposed launching facility. Please contact Linda Delaney at 586-3740 should you have any questions about this report.

Sincerely yours,

Richard K. Paglinawan
Administrator

LM:es

Enclosure

cc: [redacted]
Clayton Hee, Chairperson
Board of Trustees

12-78

Report

Palima Point Launch Pad:

A Review of the *draft Environmental Impact Statement*

The State of Hawaii, through its Department of Business, Economic Development and Tourism (DBEDT), is exploring the possibility of developing a commercial launching facility in the Palima Point Area on the island of Hawaii. This report outlines the response of the Office of Hawaiian Affairs (OHA) to the proposed facility. This response, which is solely circumscribed to examine potential adverse or beneficial impacts to the environment, wild habitats, and human settlements, stems from a careful review of the draft Environmental Impact Statement (dEIS) issued by DBEDT.

The area for the proposed launch pad comprises approximately 11,200 acres of rugged terrain and contrasting landscape. The climate is essentially dry all year around although short-lived but highly intensive rainstorms are not uncommon during the rainy season. The soils of the area, which are relatively young, coarse-textured, rocky, and shallow, sustain a scanty vegetation of shrubs and grasses. The area is somewhat isolated and inaccessible. But it contains a high density of archeological remains, which reveals a history of intensive human activity.

Currently, Native Hawaiians and other local residents use the shoreline for recreational and subsistence fishing and

seafood gathering. Agricultural activity in the area is mainly devoted to macadamia, pastures, livestock, and diversified agriculture. In addition, the area is home of a wide range of native plant and animal species. In conjunction with the Kau Forest Reserve, the area contains a high density of endangered species and is an important refuge for threatened birds.

ARCHEOLOGICAL SITES

A key concern of OHA to the proposed launching facility is the potential impact of this undertaking to an area which encompasses significant historical value for Hawaii and Native Hawaiians. The Palima Point area comprises at least, if not all coastal sections of the land divisions of Makaka, Hionamoa, Pa'ua'au 1/Palima, Pa'au'au 2, and Iliokoloa. To determine whether launching operations would adversely affect the archeological remains in the Palima Point area, an archeological survey was conducted by Cultural Surveys Hawaii (Volume IV) in an area of approximately 800 acres. One hundred thirty eight archeological sites were identified, of which 93 were evaluated as having various levels of archeological significance and 31 were recommended for preservation.

Archeologically, the area is one of high density which can be summarized as follows: one archeological site is found in every six acres of the area; one site is found in every nine acres which requires further archeological examination,

and one site is found in every 26 acres which must be preserved. A further review of the map displaying the location of the proposed launch pad reveals that it is virtually impossible to find an area free of archeological remains.

After a careful review of the report issued by Cultural Surveys Hawaii, OHA thoroughly concurs with one of the report's recommendations:

> "... the archeological remains of the settlement represent too great a cultural and scientific resource to be developed without a program of preservation. It is therefore recommended that, as part of the mitigation plan, an archeological preserve area be created to ensure the preservation of this area for future research and public appreciation."

But OHA goes beyond merely recommending a mitigation plan. OHA considers the Palima Point area to be a highly significant landmark in the history of Native Hawaiians and must be wholly preserved.

HEALTH HAZARDS

MCM Planning and Engineering-Science prepared a report assessing potential health hazards associated to the development of the Palima launch pad (Appendix A, Volume VIII). These health risks (cancer and noncancer) arise from human exposure to emissions of toxic pollutants from launching events, both normal and failures, and from accidental spills of rocket propellants. In assessing potential health risks,

MCM Planning and Engineering-Science used 66 sensitive individuals most likely to be adversely affected by launch operations (i.e., individuals with respiratory problems, infants, elderly, and so on) located at varying distances from the launching pad. A review of the location of these individuals indicate that only 9 of them (14%) were within a 20 km distance from the launch pad and only five (7.5%) were within a 10 km distance from the launch pad. OHA is concerned that the findings in Appendix A may be biased by the fact that few individuals were located actually within the high heal risk area.

MCM Planning and Engineering-Science also used eight meteorological scenarios to evaluate potential health hazards (Appendix A, Volume III). One scenario, called "worst scenario", depicts a hypothetical case where weather conditions would lead to a high ground level concentration of toxic pollutants. It is assumed that under the worst scenario, a high health risk will be associated with normal launches and launch failures. A review of the data (Tables 7.1 and 7.7) on predicted peak, 30 minute concentration of HCl and Al2O3 produced by a Delta rocket solid fuel exhaust, indicates that the worst scenario may not necessarily be conducive to the highest health risk. In fact, for locations within 10 km from the launch pad, the HCl concentrations for other scenarios, particularly the "nocturnal" scenario, were higher than that for the worst scenario. Since most of the

findings reported in Appendix A are based upon predictions for the worst scenario, it raises the question whether the health risk levels reported in Appendix A, at least for risks stemming from HCl emissions, truly reflect the kinds and levels of risks derived from the launching operations at the Palima Point.

Potential Cancer Risks

A report on Vog and Laze prepared by Engineering-Science (Appendix C, Volume X) contains some statements on cancer risk from launch exhaust products that requires further clarification. On page 3, the report states the following:

> "The results of a cancer risk assessment performed for the Captain Cook area estimated excess cancer burden of 2.1 in 100,000,000 due to a launch accident causing exposure to carcinogen substances. This is similar to the level of rate termed negligible by the U.S. Environmental Protection Agency. As a point of comparison, the national cancer rate is estimated at 25% or 250,000 per 1,000,0000. Thus the probability of rocket exhaust on launching failures causing cancer in the general population residing on the Kona Coast is so low that excess cancer are not predicted to occur due to reasonably anticipated spaceport operations."

The above paragraph suffers from three inadequacies: (i) no methodology or reference are given to support the cancer risk estimates given for the Captain Cook area, and (ii) it is unclear whether the national cancer rate used in the report (250,000 per 1,000,000) is a mortality or incident rate, and (iii) this cancer rate, which is not supported by a published reference, is actually an inordinate rate. As a point of

reference, statewide incidence and mortality cancer rates for Hawaii are about 7,100 and 1,430 per 1,000,000, respectively (The State of Hawaii Data Book, 1992, p. 72). OHA is concerned that cancer risks for various locations in the Palima Point area may appear minute and negligible when compared against 250,000 per 1,000,000 rate. OHA urges the DBEDT to review the statistics used to support the cancer risk assessment in Volumes VIII and X.

GLOBAL WARMING AND OZONE DEPLETION

Engineering-Science prepared a report summarizing concerns regarding the adverse effects of primary emissions of Delta II vehicles on global warming and ozone depletion (Appendix D, Volume X). The report states that emissions of CO_2, CH_4, H_2O, and N_2 from space launches will have an impact on the tropospheric and stratospheric concentrations of these compounds. However, the impacts are unknown because of an incomplete understanding of factors and processes triggering global warming and cooling. The report also states that present state of knowledge and limited data for the area indicates that projected emissions of hydrochloric acid (HCl), one component with the highest ozone-depleting capacity, will deplete the ozone concentration. However, they assert that the effects are so small that they are of little concern to UV-B radiation and concomitant incidence of melanoma cancer. OHA concurs with Engineering-Science that there currently is a lack of understanding about the impacts of pollutants on

global warming and ozone depletion. But OHA warns that potential adverse effects should not be termed minute or negligible based on incomplete understanding and/or limited data.

One problem found in the assessment of the effects of the proposed launch pad on global warming and ozone depletion is the short monitoring period of the local climatology. OHA views this period to be less than adequate to provide a representative profile of weather variables closely linked to pollutant dispersion and deposition. Historical data reveal wind patterns in the area characterized by high spatial and temporal variability. The aggregated data, as that shown in Figure 1 (p. 2, Appendix D, Volume X), fails to identify periods of high speed where potential hazards associated to dispersion of exhaust products and pollutants will occur.

In assessing the impact of launching activities on global warming and ozone depletion, OHA urges an in-depth long-term monitoring of the local weather. Thorough and detailed characterization of wind patterns in the area will greatly assist in the modeling of scenarios of pollutant movement, distribution, and fallout in peak periods of wind activity. This in turn, will certainly help to forecast areas of distribution and downpouring. It may be the case that pollutants' fallout may not be localized nearby the launching facility but may have far reaching distribution areas.

ACID RAIN

Acid rain, the downpouring of acidic droplets, is known to produce a wide range of adverse effects on vegetation, soils, water bodies, humans, animals, and other creatures. Extensive research on acid rain has been conducted in the continental U.S. and the results of such efforts are of public domain. Given the volume of information available, it is unclear why the report on Climate and Air Quality (Appendix B, Volume V) barely describes potential hazards associated to Al2O3, HCl, and other acidic emissions from launching rockets. Lack of data, is stated in the report, precludes a full characterization of the adverse effects of acid rain. But then the report readily concludes that expected impacts from acidic emissions to the environment should be marginal, localized, and short-term.

Two key aspects emerge from reviewing the Climate and Air Quality report: (i) the assessment of the impacts of launching activities on climate and air quality is far too incomplete to warrant the above conclusion, and (ii) there is a need to thoroughly revisit the potential impacts of acid rain on the environment in the area. Expertise on acid rain is available elsewhere and DBEDT should make an effort to reach this expertise. It is also important that DBEDT develops short- and long-term strategies to monitor on-site and off-site impacts of acid rain.

LAUNCH OPERATIONS AND HAZARDS

Light Emissions

About 20% of the launches are expected to occur after sunset. Engineering-Science examined the potential adverse impacts of light emissions resulting from night rocket launches (Appendices A and B, Volume X). Very little, if anything, is said about potential adverse effects of lighting on the ecosystem surrounding the Palima Point. High intensity lighting, even for brief periods, is reported to alter plant morphology and development (i.e., biomass production and partitioning, and flowering and fruit set) of crops grown under artificial lighting. It is likely that lighting during blasting may affect plant growth and development of wild as well as cultivated species, not to mention changes in eating, sleeping, and behavioral patterns of animals and other inhabitants of the ecosystem. Since this is a known nesting area for endangered turtles, and turtles nest only at night, this is potentially very damaging to an already endangered species. OHA urges DBEDT to thoroughly assess the potential impacts of lighting on the ecosystem surrounding the Palima Point area.

Noise Hazards

The expected sound levels from rocket launches, paths of acousting propagation, and potential impacts that launching operations would impose upon the environment at various locations including Pahala, Punaluu, and Naalehu were examined

by Adams Associates (Appendix B, Volume VII) and ACTA Inc. (Appendices C, D, and E, Volume VII). Excerpts of Adams Associates' findings are given below:

> "There should be intense sound levels for several minutes with maximums of about 110 dB overall in Pahala and Punaluu with the noisiest rockets if they are launched during favorable climatic condition and no sound focusing occurs."
>
> "..... also show that windows, bric-a-bracs, pictures on walls, etc. predictably will rattle in Pahala and Punaluu during launches and cause annoyance to some persons."
>
> "Rocket launch noise in Pahala and Punaluu may be sufficiently loud to mask normal outdoor conversation speech for a half a minute or so, ..."
>
> "Also in the closer locations, some persons may be startled by the direct rocket noise and/or awakened if sleeping."

ACTA also concludes (p. 44, Appendix C, Volume VII) that window rattle would be expected at Pahala and Punaluu where maximum C-weighted sound levels of 109 dBC would occur at normal conditions and about 115 dBC at the most adverse weather conditions. Furthermore, ACTA states that yearly day-night C-weighted average sound levels of about 63 dBC would be expected assuming a launch schedule of 24 launches per year.

From the above data, it is possible to infer that if the launch pad is built, the yearly day-night sound levels in the Palima Point area would substantially change the environment from one of relative quietness and tranquility to a one resembling a noisy urban area. Furthermore, at launch time,

the noise level would increase and would resemble one that is generally found when a high powered machine is being used at full blast.

Evidently, the launching operations would accompass substantial increase in noise levels and would bring unusual noise patterns for the Pahala and Punaluu areas. Thus, it is unclear how ACTA (p. 44, Appendix C, Volume VII) reaches the conclusion that negative reaction to such noise exposure would be minimal except for those who already oppose to the construction of the launch pad.

Explosive Overpressure Hazards

In the event of a high yield explosion at the launch pad, a shock wave generally proceeds which can have adverse effects over large areas away from the launch pad. Generally the overpressure generated by the shock wave is about 1 psi at the launch pad but decreases as the distance increases. Using BLAST, a damage assessment model, ACTA (Appendix B, Volume VII) estimated that a blast (with a TNT equivalent of 95,000 lbs) at launch pad B from a Delta II will generate maximum overpressures of 0.18, 0.17, and 0.05 psi for Pahala, Punaluu, and Naalehu, respectively (Table 4, Appendix 4, Volume VII). Based on these findings, ACTA concluded that there is a real possibility of window breakage and subsequent flying glass fragments from shock waves. The Office of Space Industry (OSI) somewhat tried to downgrade this possibility by questioning ACTA's methodology (Appendix G, Volume VII).

Evidently, the ACTA's report was viewed by OSI as highly unfavorable to the agency's efforts to build the launch pad and prompted OSI to issue a rebuttal to ACTA's findings (Appendix G, Volume VII). OHA is truly concerned with OSI's attempts to undermine the credibility of the ACTA's findings.

Accousting Propagation

ACTA Inc. examined the basic principles describing acoustic propagation and related potential hazards that may be encountered due to air blast and acoustic noise and prepared Appendix D of Volume VII. Appendix D is highly technical, difficult to read and comprehend, and lacks a summary section (p. 20).

ACTA modeled potential hazards (high-order detonation and acousting noise) using weather data for seven periods, defined as "characteristic" atmospheric soundings. Very little is said about these atmospheric soundings except that they were proposed by a UH meteorologist.

OHA has some reservations about the representativeness of these atmospheric soundings. The weather in that part of the island is one of high variability in both time and space. Therefore, these atmospheric soundings, as briefly described in page three of Appendix D, are single events in time, which may never occur again, and which may not reflect the weather conditions at the Palima Point area. Given the fact that ACTA heavily relies on these atmospheric soundings in the modeling of acousting propagation, a more appropriate approach by ACTA

could have been either include a detailed description of the rationale used in defining and selecting these atmospheric acoustings or attach a published reference supporting the methodology. Likewise, the BLAST and Monte Carlo models are mentioned in the report but neither the models are described nor a reference is given. In addition, page 20 of Appendix D is missing and this prevented OHA from assessing ACTA's findings on acousting propagation.

IMPACTS ON COASTAL ZONES

Access to Ocean and Shoreline Areas

Akala Products, Inc. reviewed the existing ocean and shoreline recreational and subsistence uses of the area surrounding the Palima Point (Appendix D, Volume IV). According to this report, the launch pads and the support facilities will be housed within the Population Control Zone (PCZ), a coastal area within a 2.9 mile arc from the Palima Point.

The PCZ is a safety buffer area designed to protect the local population from injury and property damage in the event of launch accident or flight failure. The PCZ will be off-limits for anyone except for spaceport personnel during launching operations. Although Decision Analysts Hawaii states that there will be minimal adverse effects on activities within the PCZ (Appendix A, Volume IV), the fact is that the closure of the PCZ during launching operations would

directly affect inland, shoreline, and off-shore recreational and subsistence activities.

Lack of access to shoreline areas, would certainly bring economic hardship to local people, particularly Native Hawaiians, who depend on subsistence fishing and seafood gathering to supplement their incomes. In addition to losses in revenue, Native Hawaiians in the area would be precluded from engaging in traditional fishing and gathering activities which are fundamental to Hawaiian culture and livelihood.

There are other potential side effects from the development of the launch pad. One is the high risk of land degradation. Historical rainfall data indicate that short-lived but highly intensive rainstorms are common in this part of the island which usually generate large runoff and soil losses. The PCZ is particularly prone to rainfall erosivity and earth-moving operations during road and construction work would certainly increase this risk.

Soil contamination is another serious risk stemming from deposition of toxic pollutants, accidental spills and/or improper storage and management of rocket propellants and other chemicals. But nowhere in the dEIS is found either data and/or assessment of deposition, movement, and transport of toxic pollutants. Baseline information to assess runoff, sediment and chemical transport, as well as technology for modeling chemical movement and transport are readily available elsewhere. The DBEDT should make an effort to reach this

technology and apply to the Palima Point Area.

If soil contamination will pose a health hazard in the long term, instantaneous air contamination and concomitant acute health hazards from accidental spills and improper management and/or storage is a real possibility that will always loom over the PCZ and beyond it. Three categories of accidental releases are likely to occur in the Palima Point area: (i) spills from launch vehicle tanks, (ii) spills of non-cryogenic compounds from storages, and (iii) ruptures of large cryogenic storage tanks. Outputs from the modeling of hydrazine distribution after a hypothetical accidental night time spill of a stage two fuel named Arozine 50 in an area resembling one half the size of a soccer field (50 by 46.5 m), is used here to illustrate the magnitude of the risk associated to such accidental spills. ACTA modeled patterns of hydrazin concentration for wind speeds ranging from 7 to 29 km/hour (Appendix D, Volume VI). ACTA's findings indicate that in the worst scenario (winds of 14 km/hour), one hour time mean concentration of hydrazine exceeding the 0.12 ppm SPEGL (Short-Term Public Emergency Guidance Level) will be found beyond the PCZ boundary (4.5 km from the pad location) and up to 45 km from the point of release. Concentrations of hydrazine in the Pahala area, which is located just outside the PZC would likely be up to ten times the recommended 0.12 ppm SPEGL. If mitigation procedures are used to reduce the spilling to one fifth of the area, one hour time mean

concentration of hydrazine exceeding 0.12 ppm will still be found beyond the PCZ and up to 28 km from the point of release.

OVERALL ASSESSMENT

The Office of Hawaiian Affairs concurs with DBEDT on the need to develop alternative strategies to sustain and improve the local economy on the Island of Hawaii. But OHA views the proposed Palima launch pad as one alternative which would bring such a burden of adverse effects to the environment, wild habitats, and human settlements that largely offsets any potential benefits.

DBEDT outlines several potential benefits that the Palima Point launch pad would bring to the local economy. OHA views those benefits to be limited in scope, off-site in nature, transient, and highly selective. The adverse effects would, in turn, be far reaching, long-lasting and virtually irreversible. From the above results, the emerging conclusion is that if the launch pad is built, the Palima Point area will irreversibly change from a virtually risk-free environment to a one harboring multiple risks and health hazards. In view of the serious constraints associated with the proposed launching pad, OHA unequivocally opposes any measure aimed to build a launching pad in the Palima Point area.

But OHA is willing to assist State and local agencies in finding viable alternatives for fostering economic development

providing that such alternatives bring a balanced growth with mechanisms to (i) ensure equal access and participation of Native Hawaiians, (ii) enforce protection and conservation of the environment and wild habitats, and (iii) sustain and promote Hawaiian culture and values.

JOHN WAIHEE
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SEP. 30 1994

The Honorable Dante Carpenter
Administrator
Office of Hawaiian Affairs
711 Kapiolani Blvd.
Suite 500
Honolulu, HI 96813-5249

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Carpenter:

We acknowledge receipt of the Kona Hawaiian Civic Club resolution. Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

We would like to compliment the reviewer for the excellent, well researched comments. ACTA Inc., Dr. Richard Brock, Cultural Surveys Hawaii, Engineering Science, and Risk Science Associates contributed to the preparation of the following responses:

Comment: *OHA considers the Palima Point area to be a highly significant landmark in the history of Native Hawaiians and must be wholly preserved.*

Response: As stated on page 1-1 of Volume I, the project is intended to meet a stated goal of the State to strengthen and diversify Hawaii's economy. Governor John Waihee directed DBEDT to investigate potential space-related activities which would be most appropriate for Hawaii. If an actual launch project for Palima Point emerges at some time in the future, the legislative and regulatory authorities will make the determination if it is an appropriate action.

The permitting process for the spaceport includes compliance with all environmental laws, including those related to archaeological sites. Mitigation procedures begin with inventory survey and historical research, and involve preparation, approval and implementation of data recovery and preservation plans, as well as continued management.

Continued use of this area for agricultural purposes, particularly grazing and dairy farming, is not a guarantee that archaeological sites will be preserved. There are many instances in the area in which cattle have impacted archaeological sites, either directly with the activity of hooves, or mechanical pasture improvement, such as vegetation clearing, chain-dragging and other bulldozing. It is also true that agricultural uses, generally, do not come under the permit process, so that protection of archaeological sites cannot be controlled through coordination with government agencies.

Figure II-1.1 on page 2-2 of Volume I contains a map depicting land ownership at the proposed project site. The State of Hawaii owns about 20 percent of the land at the site; the rest is held in private ownership. In order to "wholly preserve" the area, the State of Hawaii would need to purchase or lease the land from the private landowners. On page 3-24 of Volume I, it is stated, "By statute, the State Department of Land and Natural Resources (DLNR) has exclusive responsibility for the acquisition of any lands by the State, and all such lands must be used for a public purpose."

It is possible that future state policy may enable the preservation of Palima Point. It should be noted, however, that the alternative Kahilipali Point site was determined to contain the richest environmental resources. Notably, page 9-7 of Volume II states,

> *"The coastal strip from Waikapuna Bay to Ka'alu'alu Bay contains numerous site complexes, some of which represent village-like clusters of habitation and related features...The coastal area with greatest site density is between Ki`i and Lae o*

Kamilo. Also the more architecturally impressive structures are within this general area...The lava tube/sink Waipouli was probably a major source of potable water during prehistoric time, and was definitely utilized during historic times. The petroglyph fields observed are in excellent condition and contain a wide range of figure types."

It is the opinion of researchers who have surveyed the two sites that Kahilipali Point is the richest in environmental resources. The majority of archaeological sites at Kahilipali Point have high cultural and interpretive value. Because state funds are finite, it seems more sensible that preservation efforts be directed towards Kahilipali Point, rather than Palima Point.

Comment: *OHA is concerned that the findings in Volume VIII, Appendix A may be biased by the fact that few individuals (sensitive receptors) were located actually within the high health risk area.*

Response: As stated on page 9-4 of Volume II, the primary site screening criteria were population considerations and operational performance. This is precisely the reason that few sensitive receptors are located in the high health risk area. RSA made every attempt to locate all "sensitive receptors" from the Pahala area to Kailua-Kona. Workers at the spaceport site were assumed to be healthy young individuals wearing protective clothing and therefore not "sensitive receptors" as defined in Chapter Five of Volume I of the dEIS.

Comment: *The weather scenario, "worst case", does not always indicate the highest health risk.*

Response: Your observation is correct and is also consistent with the reports. On-site toxic diffusion models applied eight weather scenarios, seven of which are actual soundings. The eighth, the "Hypothetical Worst Case", is an artificial condition. As stated on page 5-82 of Volume I,

"...the Hypothetical Worst Case is based on the Kona weather condition. All wind speeds at different altitudes are set to the same bearing and the base of the thermal inversion is set to the lower limit of the tradewind inversion mixing region. The Hypothetical Worst Case does not represent expected weather conditions but simply serves as a mechanism to determine what the effects would be if the winds at all altitudes were directed toward various receptor sites."

A careful distinction must be made between the Hypothetical Worst Case weather profile and worst case outcomes. The reason the Nocturnal Drainage Condition weather profile yields worst case outcomes under certain conditions is due to the low inversion level. The low inversion level associated with Nocturnal Drainage Condition would trap more material at the surface; this is the reason concentrations are higher than for the Hypothetical Worst Case for certain events. The low inversion level associated with the

Nocturnal Drainage Condition is not present for any other weather profile (including the Kona, upon which the Hypothetical Worst Case is based). In fact, the surface wind direction below the Nocturnal Drainage inversion is always in the direction of the ocean, away from the populated areas. In addition, Nocturnal Drainage occurs only during early morning hours for a relatively short period of time.

If, at the time of launch, there is an indication that the launch will present a risk to any person or structure on land, the launch is held until the wind conditions change. This is done at Vandenberg Air Force Base and, in addition, it is a standard practice at VAFB to compute the potential risk prior to launch using the current wind (and wind uncertainties). If the risks are higher than what are considered acceptable, the launch is held until the winds change and the risks have dropped to an acceptable level. This same procedure would be used at Spaceport Hawaii.

Comment: *The report on Vog and Laze suffers from three inadequacies: (i) no methodology or reference are given to support the cancer risk estimates given for the Captain Cook area, (ii) it is unclear whether the national cancer rate used in the report (250,000 per 1,000,000) is a mortality or incident rate, and (iii) this cancer rate, which is not supported by a published reference, is actually an inordinate rate. As a point of reference, statewide incidence and mortality cancer rates for Hawaii are about 7,100 and 1,430 per 1,000,000, respectively (State of Hawaii Data Book, 1992, p. 72). OHA urges DBEDT to review the statistics used to support the cancer risk assessment in Volumes VIII and X.*

Response:

(i) The references for the estimated excess cancer risk of 2.1 in 100,000,000 at Captain Cook due to the proposed project are page 8-11 and Table 8-69 of Appendix A of Volume VIII of the DEIS. The methodology behind this estimate is described throughout Appendix A of Volume VIII of the DEIS. For example, page 4-1 and Tables 4-1 and 4-2 of Appendix A of Volume VIII of the DEIS describe the assumptions made in determining exposure under the reasonable maximum exposure (RME) scenario for normal launch and launch failure scenarios. The algorithms used to calculate exposure (intake) are described in Section B.1 of Appendix A of Volume VIII of the DEIS. Determination of cancer risk is described on pages 5-1 and 5-2 while cancer unit risk and slope factors are listed in Table 5-1. The algorithms used to convert exposure (intake) to cancer risk are described on page B-10 of Appendix A of Volume VIII of the DEIS.

(ii) The national cancer rate referenced in the report (250,000 per 1,000,000) is the background cancer incidence rate in the United States (see page 14-1 of Appendix A of Volume VIII of the DEIS).

(iii) The reference for the national cancer incidence rate is the American Cancer Society, Cancer Facts and Figures 1993 (updated in 1994). This document states that, according to present rates, about 30 percent of Americans now living will eventually have cancer.

Assuming that the statewide incidence and mortality cancer rates for Hawaii given in the comment are correct, we have quantitatively evaluated the contribution of the cancer risks determined in the health risk assessment at Pahala, Na'alehu, and Captain Cook to the statewide cancer incidence rate of 7,100 per 1,000,000 (7.1×10^{-3}, which is equivalent to a rate of 0.71 percent). Tables listing cancer risk estimates due to deflagration events were revised and are attached to this letter. The revisions were made due to an error in the cancer risk calculations for UDMH and FDH during deflagration. The inhalation unit risk factor for UDMH and FDH used in the health risk assessment was 4.9×10^{-7} $(\mu g/m^3)^{-1}$, while the CAPCOA document (1992 and 1993) CAPCOA document (1992 and 1993) lists a screening unit risk for UDMH of 4.9×10^{-4} $(\mu g/m^3)^{-1}$, a factor of 1000 higher than the value used in the assessment. Table 8-69 of Appendix A of Volume VIII of the DEIS and Revised Table 8-69 (attached) list the following cancer risk estimates:

	Table 8-69	Revised Table 8-69
Pahala	4.0×10^{-7}	4.3×10^{-7}
Na`alehu	1.4×10^{-7}	1.5×10^{-7}
Captain Cook	2.1×10^{-8}	2.5×10^{-8}

These cancer risk values do not result in a significant increase in cancer risk when added to the statewide cancer incidence rate of 7.1×10^{-3} or to the statewide cancer mortality rate of 1.4×10^{-3} (1,430 per 1,000,000). Thus, the conclusion made in Appendix A of Volume VIII (the human health risk assessment) and Volume X, Appendix C (the report on vog and laze prepared by Engineering-Science, Inc.) of the dEIS is correct and *"the probability of rocket exhaust or launch failures causing cancer in the general population residing on the Kona Coast is so low that excess cancers are not predicted to occur due to reasonably anticipated spaceport operations."*

Comment: *The launch exhaust of Delta II vehicles will have an effect on global warming and ozone depletion. The impacts on global warming are uncertain due to an incomplete understanding of the factors and processes triggering the warming or cooling. The report indicates a depletion of ozone due to the hydrochloric acid (HCl) in the exhaust emissions but suggests the effects are so small that they are of little concern. In addition, there is less than adequate information to provide a representative profile of weather variables closely linked to pollutant dispersion and deposition. The aggregated data fails to identify periods of high speed where potential hazards associated to dispersion of exhaust products and pollutants will occur. An in-depth long-term monitoring of the local weather is needed to characterize the wind patterns.*

Response: There are some uncertainties of how emission of greenhouse gases by the project will ultimately affect global warming or cooling, or whether the net effect may be zero. As indicated on page 3 of Appendix D (Volume X), *"it could be argued that the demand would be met by another site if the Hawaii facility is not built, so there may be no net increase in global warming by launching from Hawaii."* In addition, from the global climatic standpoint there would be no benefit gained by studying wind

patterns at the Palima Point region since factors affecting climate change are global rather than local. Greenhouse gases are by far a more valuable variable to measure and this is being performed at the Mauna Loa observatories.

With regard to ozone depletion, a conservative approach was used to estimate the ozone depleting potential of the HCl and N_2 in the launch emissions. It was assumed that all emissions in the troposphere and stratosphere would contribute to the stratospheric ozone depletion and that all of the N_2 would be converted to N_2O. On the basis of these assumptions, the indicated launches of the Delta II would deplete the stratospheric ozone by approximately 0.009 percent annually. Using these conservative assumptions and methods from an EPA approach described on Page 10 of Volume X, Appendix D, an estimated risk level of 0.045 per one million persons was established. This level is considerably below the commonly acceptable level of one excess cancer per one million persons used for environmental risk analyses. As in the global warming issues discussed above, the demand would be met by another site if the Hawaii facility is not built, so there may be no net increase in ozone depletion by launching from Hawaii.

A study of the local wind patterns would not benefit the understanding of global ozone depletion. These local wind patterns would, however, aid in the understanding of the vertical wind profiles which is beneficial in assessing initial plume dispersion as well as any localized depression in the ozone concentrations that may occur in the launch column. If the project is built, wind monitoring would be performed to establish a local climatology as well as provide real-time inputs into dispersion models to aid in the launch go/no-go decision process.

Comment: *The assessment of impacts of launch activities on climate and air quality and potential impacts of acid rain on the environment is incomplete.*

Response: Air quality impacts are discussed on in Volume One, page 4-26 of the dEIS. The dEIS states that *"the existing air quality in the project area is affected mostly by air pollutants from natural sources, transportation sources, and agricultural activities."* The dEIS further states that,

> *"...under normal operating conditions of the proposed project, minimal emissions of RP-1 (kerosene vapor), hydrazine, MMH, and nitrogen tetroxide may occur during fuel loading activities for the Atlas IIAS. Emissions due to venting of RP-1 from storage tanks during propellant loading operations are expected to be minimal due to the low vapor pressure of this substance. Emissions of hydrazine during transfer and loading into rockets is expected to be minimal due to its low vapor pressure. Emissions of trichloroethylene may occur during rocket engine flush and could result in high maximum hourly hydrocarbon emissions. Releases of hypergolic propellants during Delta II normal pre-launch operations and scheduled post-launch maintenance are not expected to result in significant adverse impacts to the environment."*

Emissions of EPA Criteria Pollutants are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Thus, impacts to ambient air quality, including visual impacts to scenic vistas, from the Hawaii Spaceport are expected to be insignificant because the emissions are generated intermittently, and are of short duration.

Air quality effects from rocket launches are discussed in Volume I (page 5-83) of the dEIS. Estimated annual launch exhaust emissions that would be generated from launch operations at the Hawaii spaceport are: aluminum oxide (PM_{10}), 100 tons/year; carbon monoxide, 100.8 tons/year; and, nitrogen oxides, 8 tons/year. Thus, emissions of criteria pollutants during rocket launches are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Cumulative impacts on air quality from launch operations, including visual impacts to scenic vistas, are not anticipated to be significant because of the intermittent nature of the vehicle launches. Mitigation measures to be taken to avoid impact on population centers by the exhaust ground cloud will limit launches to times when meteorological conditions are favorable.

Impacts of spaceport employee vehicular trips and vehicular carbon monoxide effects were also assessed (DEIS Vol.I, page 4-27). Modeling results indicate that emissions generated by employee vehicles would result in an increase of 0.1 ppm by volume ($114.\mu g/m^3$) in the ambient concentration of CO. This value represents only 1 percent of the 1-hour HAAQS which is $10,000.\mu g/m^3$. Thus, the air quality impact of mobile sources associated with the proposed project is considered insignificant.

Acid rain effects. The area near the proposed site of the Spaceport facility is subject to atmospheric concentrations of naturally occurring corrosive substances such as sodium chloride from the ocean and emissions of acidic gases and particulates from nearby Kilauea Volcano including sulfates, nitrates, chloride, fluoride, etc. (see Volume VIII, Appendix A, Section 11.0 of the dEIS, the health risk assessment).

The pH of rainfall due to wet deposition of HCl following a normal launch or conflagration event was evaluated in the health risk assessment. Section B.1.4.1 on page B-7 (Volume VIII, Appendix A) determined that the concentration of HCl due to wet deposition following a normal launch (assuming that immediately after launch it begins to rain) is 0.45 mg/l. In the event of a conflagration episode, assuming that all of the HCl possibly generated by the nine solid rocket boosters is released, the concentration of HCl due to wet deposition would be 2.1 mg/l. The pH of the water collected following these two events would be 4.9 and 4.2, respectively (calculated according to the algorithm presented on page 3-7 of DEIS Volume VIII, Appendix B, the ecological risk assessment. The pH of a neutral solution is 7.0 while the pH of municipal drinking water is required to be between 6.5-8.5 according to the National Secondary Drinking Water Regulations (secondary maximum contaminant levels; Last 1980).

Average pH of rainfall in the continental United States ranges from 4.2 in the Ohio area (considered acid rain) to levels greater than 5.0 west of the Mississippi (up to 5.4 in Northern California and Oregon (Kulp 1988). The contribution of rocket exhaust clouds to the formation of acid rain around Palima Point may be nominal because

acid rain is also formed through the liberation of sulphates and nitrates through volcanic activity. A study of acid rain in the area around Volcanoes National Park measured the pH of rainwater and found that the pH varied between 2.6 and 4.6 during the study period (Nachbar-Hapai et al. 1989). Thus, normal rainfall in the area is already more acidic than wet deposition of HCl during a conflagration event. Given the ambient conditions of the area and the fact that atmospheric acidic chemicals already exist, the contribution of HCl emitted following launch episodes to "naturally" occurring corrosion is probably not significant.

Comment: *Since this is a known nesting area for endangered turtles, and turtles nest only at night, this (light from launches) is potentially very damaging to an already endangered species. OHA urges DBEDT to thoroughly assess the potential impacts of lighting on the ecosystem surrounding the Palima Point area.*

Response: As noted in Appendix IIIE of the dEIS,

> *"Sea turtles nest on the beaches at the Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success, the facility operation has reduced all unnecessary lighting near the beaches and employed low pressure sodium lights with shields. In the event of an evening launch, the operational plan uses only lighting in critical areas. The lighting procedures are inspected by the U.S. Fish & Wildlife Service for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill. The hill itself is situated right on the shoreline and the nesting beach seaward of it; it is probable that Kamehame Hill will serve to block much of the light from inland sources. However, as a precautionary measure, it is suggested that a light management plan similar to the Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built."*

It should be further noted that during the several trips made to the Kamehame Hill area during the field work of Dr. Richard Brock and his associates (from 1990 to 1993), there was considerable evidence of fishermen camping on the beach (particularly at the southern end) in the form of tent pole structures, rubbish and firepits (a source of light as well as flashlights as evidenced by numerous expended dry cell batteries in the area). During one trip, vehicles and campers were established on the south end of Kamehame Hill. Dr. Richard Brock observes in his report that:

> *"The great concern of the public over turtle nesting at Kamehame Hill is not borne out by the actions of the public. This does not make the proposed project "correct", but it points out the fact that disturbance to turtles attempting to nest on this beach have probably been ongoing for some period of time. With a management program in place that controls access and lighting, the situation should be better than it has been in the recent past insofar as sea turtle nesting is concerned."*

Comment: *The launch operations would accompass [sp.] substantial increase in noise levels and would bring unusual noise patterns for the Pahala and Punalu'u areas. Thus, it is unclear how Acta reaches the conclusion that negative reaction to such noise exposure would be minimal except for those who already oppose the construction of the launch pad.*

Response: As noted in Volume I of the dEIS (page 5-116)

> *"...due to the low pitch and short duration of rocket launch noise, there is no danger of exceeding noise exposure limits set by OSHA with respect to causing hearing damage outside the PCZ. Rocket launch noise in Pahala and Punalu'u may be sufficiently loud to mask normal outdoor conversation speech for a half minute or so, but should not mask normal speech at more distant locations."*

It is primarily because of the occasional nature and short duration of the launch events that the conclusion was reached that negative reaction to launch noise would be minimal.

Comment: *OHA is concerned with OSI's attempts to undermine the credibility of ACTA's findings regarding explosive overpressure hazards.*

Response: There was a difference in professional opinion in that OSI believed that the overpressures that ACTA was predicting were too high and cited a generally used Air Force Standard to support their position. ACTA's data was taken directly from a test program conducted at Cape Canaveral. Both positions are valid and it should be emphasized that these are models, based on assumptions. It should also be noted that the OCST methodology is the one that is accepted at the national ranges. Section 11-200-16 of the EIS Rules states:

> *"In order that the public can be fully informed and that the agency can make a sound decision based upon the full range of responsible opinion on environmental effects, this statement must include responsible opposing views, if any, on significant environmental issues raised by the proposal."*

Publication of both the ACTA and OSI results fulfills this mandate. A discussion of the differences between the two approaches follows:

(1) The cited overpressure of 0.5 to 1.0 psi to break windows (Hazard Analysis of Commercial Space Transportation, OCST, 1988) is based upon 50 percent or more window breakage. The levels .05 to .5 psi examined by ACTA represent a smaller probability of breakage of glass. For instance, 500 broken windows in a community represents a very small percentage of the glass in the community (a house has typically 19 panes, 500 houses and corresponding businesses would have more than 10,000 panes), but prediction of 500 broken windows (ave. $P_{breakage} \approx .05$) in such a community can be the basis of a launch hold.

(2) The breakage probability curves included with the ACTA report were based on actual window strength measurements computed from glass sampled at Patrick AFB, Florida.

The glass strength uncertainty is modeled with a Weibull distribution and the loading was based on an ideal blast pressure wave. The window responds dynamically and static fatigue is included in the model.

(3) The blast analysis is based on an explosion on the ground. The overpressures at distance predicted by the BLAST program were based on actual measurements made in a test program near Patrick AFB, Florida. They are higher at a distance than those in Air Force Manual-100 and other similar documents because the models used for the predictions in AFM-100 were based on Kingery and Pannill work using data from mid-continent tests (Suffield, Alberta, Canada)--where the atmosphere is more likely to be adiabatic with temperature decreasing from the ground (some of those tests were made on very hot days in August)--whereas the BLAST measurements were based in coastal areas where the atmosphere is maritime and typically has inversions that lead to higher overpressures at distances.

BLAST will predict higher overpressures at a distance in a maritime environment. This position is supported by work at the Air Force Weapons Lab, Sandia and the Defense Nuclear Agency. The single curve developed by Kingery and Pannill that is used universally, appears to underestimate overpressures at a distance and in a maritime environment. A Table and Figure showing a comparison of several models in predicting the overpressure from the spaceport to Pahala for a range of explosive yields (equivalent number of pounds of TNT) are attached to this letter.

BLAST, in general, models the phenomena probabilistically and no biases are included in the program to intentionally make it conservative. The only area of conservatism could be the selection of a TNT equivalency which is highly speculative to begin with. ACTA used AFM 127-100 or vehicle manufacturer information, because they believed that the high end of the TNT equivalencies in the OCST report were much too conservative.

No attempt was made in the ACTA study to establish the probability of an event leading to an explosion on the ground. It was merely stated that the probability was .001 or less. ACTA was directed to compute hazards, not risks. Evaluating the explosive blast impact without doing a risk analysis invariably leads to a more severe conclusion.

The "hazard only" approach was first recommended for launches from Cape Canaveral and Vandenberg AFB in the late 1970s. Using this approach it appeared that some vehicles would have very few days for launch. The risk approach (BLAST) considers the potential for local caustics, the locations of population centers, and computes the glass dynamic response. BLAST also computes glass breakage probability, models glass fragmentation and motion, models the occurrence of casualties (taking into consideration the building occupancy), and also takes into account vehicle failure mode probability, etc. The risk approach has reduced the probability of launch holds enormously at both ranges so that blast considerations are of less importance than debris and toxics.

Although ACTA believes that the blast hazard evaluation of the Hawaiian Space Port was based on the very best data and models available, they advise that a risk analysis would be more realistic and show that the impacts are much less threatening than they appear in a hazard analysis. Again, it should be emphasized that the methodology used by OSI is the standard for the national ranges.

Comment: *Appendix D of Volume VII is highly technical, difficult to read and comprehend, and lacks a summary section (page 20).*

Response: Appendix D of Volume VII, "Acoustic Propagation", attempts to explain a complex phenomenon in an already simplified manner. Unfortunately, page 20 which included the summary and list of references failed to be reproduced in Volume VII. A copy of this page is attached to this letter.

It was hoped that the discussion in Appendix VIID, with the accompanying figures showing the bending of the acoustic raypaths due to the various atmospheric conditions, would help the untrained reader to gain some understanding of why some areas are more strongly affected by loud noise, such as explosions or thunderclaps, than other areas, which may be located closer to the acoustic source. A classic example of the problem, which involved severe window breakage, was the Medina incident (Pape et al., 1966). This incident involved the accidental explosion of 111,500 pounds of chemical high explosive near San Antonio, Texas, that resulted in widespread window pane damage in the metropolitan area located from 4 to 14 miles from the detonation source. As stated in the Appendix VIID (pages 2 and 3), inversion and caustic focusing propagation conditions tend to focus the acoustic (sound or blast) energy back to the ground so that damaging sound levels or overpressures may be experienced at greater distances from the source than from the more benign gradient or isotropic propagation conditions.

The character of the sonic velocity profile determines what type of propagation condition exists; the sonic velocity profile in turn is determined by the atmospheric parameters associated with the weather conditions at the site (DEIS Appendix VIID, page 3). Several examples of sonic velocity profiles associated with "representative" weather conditions for the Palima Point site are shown in the Appendix (Figs. 1-3, p. 5-6) followed by other examples with raypaths for each important class of propagation condition - gradient, inversion, and caustic - based upon actual meteorological data obtained in the Palima Point area.

In addition to ground level propagation conditions, the Appendix VIID describes the significance of an atmospheric waveguide (page 5) where acoustic (sound) energy is trapped and propagates very large distances with low attenuation (loss of strength). A famous example of an acoustic waveguide is the SOFAR Channel in the ocean, where sound can be propagated across the entire Pacific Ocean basin (and even into the Atlantic Ocean) with minimal attenuation. For rocket launches, *"strong overpressures or annoying levels of vibration may be experienced at substantial distances away from the source if both source [rocket] and receiver [sensitive site] are located within the waveguide."*

Comment: *Very little is said about the atmospheric soundings except that they were proposed by a UH meteorologist. Given the fact that ACTA heavily relies on these atmospheric soundings in the modeling, they should have included a detailed description of the rationale used in defining and selecting them or attach a reference supporting the methodology.*

Response: The rationale for selecting these "characteristic atmospheric soundings" was presented by Dr. Tom Schroeder, as listed in the references to Appendix VIID, page 21 (attached). A more detailed description of the weather patterns at Palima Point is provided in DEIS Volume I, page 3-40 and Appendix VB, "Climate and Air Quality." The soundings used are considered representative of the meteorological conditions observed at the Palima Point site based upon Dr. Schroeder's experience and studies at Palima Point and nearby locations (Honuapo).

Five of the soundings are data taken directly at the Palima Point site during a monitoring program in 1991; one sounding [TD2] is from Honuapo located about 8 miles southwest of Palima Point; one sounding [KON] is from Hilo located about 45 miles northeast of Palima Point. Soundings from locations other than Palima Point are used because the limited sounding data from the Palima Point study in 1991 do not provide examples of all characteristic weather conditions that may occur at the site throughout the years (e.g., no Kona conditions were encountered during the study).

The limited weather data available from the Palima Point site and the high cost associated with the acquisition, processing and interpretation of such data precluded more robust, statistical analysis of the effects of weather conditions on acoustic propagation at the site for this preliminary analysis. Nevertheless, the seven characteristic profiles examined in this study - together with the hypothetical worst-case profile - are sufficient to provide information regarding the types of propagation conditions likely to be encountered during proposed launch operations at the site, and identify weather conditions that may be unfavorable for launch. If a launch facility were to be constructed at the site, the dEIS specifically recommends a more comprehensive meteorological monitoring program be undertaken (Volume I: pages S-15 and 5-82) prior to operation of the launch facility. This recommendation was again listed in the Unresolved Issues section (Volume II, page 8-17):

> *"Extensive meteorological monitoring (of at least one years' duration) from ground level to the upper atmosphere must be conducted--and toxic dispersion/diffusion, explosive overpressure and debris models must be run for each specific rocket that will be launched--before the launch facility becomes operational."*

Furthermore, implicit in the launch procedure (Volume I, Chapters Two and Five) is the continuous monitoring of meteorological conditions during countdown, which requires establishment of a permanent weather station at the site.

Comment: *The BLAST and Monte Carlo models are mentioned in the report but neither of the models are described nor is a reference given.*

Response: The reference for the BLAST and Monte Carlo models are given on page 20 of Appendix VIID, the page that is missing from your copy. The reference for BLAST is attached.

Comment: *Closure of the PCZ during launching operations would directly affect inland, shoreline, and off-shore recreational and subsistence activities. In addition to losses in revenue, Native Hawaiians in the area would be precluded from engaging in traditional fishing and gathering activities which are fundamental to Hawaiian culture and livelihood.*

Response: As stated in Volume II (page 7-21), improved access may increase the level of public use between Punalu`u and Palima Point. Currently the site permits limited vehicular access. Closures would temporarily disrupt coastal access and use, however, the intermittent effects of shoreline closure would be limited to between 10 and 40 days per year. Implementation of the Shoreline Access Management Plan will serve to mitigate concerns from both current and future users. Losses in revenue could be offset by compensation from the launch facility operators, as is the case at Vandenberg AFB and Cape Canaveral AFB.

Comment: *Assess risks of soil contamination due to deposition of toxic pollutants.*

Response: Substances potentially deposited to soil in normal launch and accident scenarios are addressed below.

Aluminum Oxide

Ground level deposition and subsequent ingestion of aluminum oxide emitted during normal launch events is quantitatively evaluated in Appendix VIIIA (Section 7.0) of the dEIS while Section 8.0 addresses conflagration events.

The predicted maximum soil concentration of aluminum oxide due to deposition of this substance released during a normal launch is 3.8×10^7.µg/kg soil at Punalu`u Condos under Kona (worst case) scenario (Appendix VIIIA, Table 7-9). Under other scenarios, the soil concentration resulting from deposition would be less, around 1×10^6 to 3×10^7.µg/kg soil. The level of 3.8×10^7.µg/kg is equivalent to 38,000 mg/kg or 3.8 percent aluminum oxide in soil. This concentration would occur only in a limited area near the facility if launches were made under Kona conditions.

The predicted maximum soil concentration of aluminum oxide due to deposition of this substance released during an on-pad conflagration episode involving 9 SRBs is 9.78×10^2.µg/kg at Punalu`u Condos (Appendix VIIIA, Table 8-8). This level is equivalent to 0.978 mg/kg or 9.78×10^{-5} percent aluminum oxide in soil. The predicted maximum soil concentration of aluminum oxide due to deposition of this substance released during conflagration of an ascending vehicle at 10 seconds after

lift-off is 7.74×10^4.µg/kg at Pahala Preschool and Ka`u Hospital (Appendix VIIIA, Table 8-25). This level is equivalent to 77.4 mg/kg or 7.74×10^{-3} percent aluminum oxide in soil.

Appendix VIIIA states that aluminum is the third most abundant element in the earth's crust, comprising 8.3 percent of its volume and ranging up to 10 percent of the composition of rock. Due to its ubiquitous presence in soil, air, and water, it is commonly found in food and drinking water and environmental exposure to this substance is virtually universal. Deposition of aluminum oxide released during normal launches may result in an increased concentration of this substance in soil. It is unlikely, however, that release of this substance during the conflagration events evaluated will result in an increase in its soil concentration. Due to the ubiquitous nature of aluminum in soil, air, water, and food, it is unlikely that the increase due to normal launch emissions will result in adverse health effects. This is evidenced by the fact that the chronic noncancer hazard index due to inhalation, ingestion, and dermal absorption of this substance is less than 1.0 under this scenario (Appendix VIIIA, Table 7-14 and Revised Table 7-14, attached). Deposition of aluminum oxide in soil resulting from 1 launch per year over a 70 year period, however, may result in accumulation of this substance in soil at a level which results in a chronic noncancer hazard index greater than 1.0 and may cause adverse health effects.

Hydrazine

Wet deposition and subsequent ingestion of hydrazine emitted during a deflagration event is quantitatively evaluated in Appendix VIIIA, Section 8.0 of the dEIS. The methodology is described in Appendix B of the health risk assessment, page B-8 and in Table B-3. It is estimated that following a deflagration event, 496 lb of hydrazine would be available for dispersion over a 10 km radius area of the island which is equivalent to 310 square km. Assuming a soil mixing depth of 0.01 m and a soil bulk density of 1333 kg/m^3, this results in a hydrazine soil concentration of 5.5×10^{-2} mg/kg:

$$C_{soil}, \text{ mg/kg} = \frac{\text{Hydrazine} \times CF_1}{SA \times D \times BD \times CF_2 \times CF_3} = 5.5 \times 10^{-2} \text{ mg/kg}$$

where

Hydrazine	=	pounds of hydrazine available for dispersion following a deflagration event, 496 lb
SA	=	surface area of 10 km radius, 310 km^2
D	=	depth of soil mixing, 0.01 m
BD	=	soil bulk density, 1333 kg/m^3
CF_1	=	conversion factor, 10^6 mg/kg
CF_2	=	conversion factor, 2.2 lb/kg
CF_3	=	conversion factor, (1000 m)^2/km^2

Assuming a soil ingestion rate of 100 mg/day for a 70-kg adult results in a daily dose due to soil ingestion of 7.7×10^{-8} mg/kg/day. Applying the oral potency factor

for hydrazine listed in Table 5-1 of Appendix VIIIA (3.0 $(mg/kg/day)^{-1}$), gives a cancer risk due to this potential exposure pathway of 2.3×10^{-7}. Applying the oral noncancer acceptable exposure level listed in Table 5-2 (5.7×10^{-4} mg/kg/day), gives a noncancer hazard due to this potential exposure pathway of 1.4.

There are several uncertainties in this analysis, however, which make it highly conservative and unrealistic. First, the soil half-life of hydrazine is listed as ranging from 1-7 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992). This indicates that hydrazine from a deflagration event deposited to the soil at the concentration determined above will <u>not</u> be available for a 70-year lifetime exposure, and thus the estimates of risk and hazard are unreasonably high.

Second, photodegradation of hydrazine may occur when it is released to the atmosphere and while it undergoes wet deposition. HSDB (1992) reports that once present in the atmosphere, hydrazine undergoes rapid degradation by hydroxyl radicals, ozone, and nitrogen dioxides present in the atmosphere. Experimental studies have revealed half-lives for hydrazine of about 3 hours due to reaction with hydroxyl radicals, about 9.2 hours due to reaction with ozone, and about 2 hours due to reaction with nitrogen oxides (HSDB 1992). In this analysis it is assumed that photodegradation does not occur and all the hydrazine present in the vehicle is dispersed to the ground during a deflagration event. This is a worst-case scenario and unlikely to occur. Thus the estimates of risk and hazard made above are unreasonably high.

<u>UDMH</u>

Wet deposition and subsequent ingestion of UDMH emitted during a deflagration event can be evaluated in the same manner as hydrazine. The methodology is described in Appendix B of the health risk assessment, page B-8 and in Table B-3. It is estimated that following a deflagration event, 441 lb. of UDMH (Nyman 1992) would be available for dispersion over a 10 km radius area of the island - 310 square km. Assuming a soil mixing depth of 0.01 m and a soil bulk density of 1333 kg/m^3, this results in a UDMH soil concentration of 4.8×10^{-2} mg/kg:

$$C_{soil}, \text{ mg/kg} = \frac{\text{UDMH} \times CF_1}{SA \times D \times BD \times CF_2 \times CF_3} = 4.8 \times 10^{-2} \text{ mg/kg}$$

where

UDMH	=	pounds of UDMH available for dispersion following a deflagration event, 441 lb.
SA	=	surface area of 10 km radius, 310 km^2
D	=	depth of soil mixing, 0.01 m
BD	=	soil bulk density, 1333 kg/m^3
CF_1	=	conversion factor, 10^6 mg/kg
CF_2	=	conversion factor, 2.2 lb/kg
CF_3	=	conversion factor, $(1000\ m)^2/km^2$

Assuming a soil ingestion rate of 100 mg/day for a 70-kg adult results in a daily dose due to soil ingestion of 7.7×10^{-6} mg/kg/day. Applying the inhalation potency factor for UDMH listed in the attached Revised Table 5-1 (1.72 $(mg/kg/day)^{-1}$), gives a cancer risk due to this potential exposure pathway of 1.2×10^{-7}. Applying the oral noncancer acceptable exposure level listed in Table 5-2 of Appendix VIIIA of the dEIS (5.7×10^{-4} mg/kg/day), gives a noncancer hazard due to this potential exposure pathway of 1.2×10^{-4}.

As mentioned for hydrazine, there are several uncertainties in this analysis which make it highly conservative and unrealistic. First, the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). UDMH from a deflagration event deposited to the soil at the concentration determined above will <u>not</u> be available for a 70-year lifetime exposure, and thus the estimates of risk and hazard are unreasonably high.

Second, degeneration of UDMH may occur in the atmosphere due to reaction with ozone or NO_x. In this analysis it is assumed that atmospheric degradation does not occur and all the UDMH present in the vehicle is dispersed to the ground during a deflagration event. This is a worst-case scenario and unlikely to occur. Thus, the estimates of risk and hazard made above are unreasonably high.

<u>Comment:</u> *Assess risks of soil contamination due to accidental spills and/or improper storage and management of rocket propellants and other chemicals.*

<u>Response:</u> In order to prevent soil contamination resulting from accidental propellant spills at the propellant storage areas of the proposed facility, mitigation measures including containment systems will be implemented. The following description of the mitigation measures to be taken is found on page 5-135 of Volume I of the dEIS. There it is stated that:

> *"State and Federal regulations require that propellant storage areas incorporate proper containment. Design of the propellant storage, payload processing and launch areas must include containment. Liquid fuel storage tanks will be surrounded by dikes, barricades, berms or other suitable protective mounds. Reservoirs will have a capacity 10 percent greater than the propellant storage tanks. These measures will limit the surface area of a spill and prevent the contents of tanks from mixing with incompatible material that could result in fire, explosion or toxic conditions. The containment areas will have impervious linings to protect groundwater from contamination."*

Improper storage and management of propellants and other chemicals will be prevented by implementation of strict safety measures. The dEIS states that:

> *...the most important mitigating measures involve reducing or eliminating the probability of accident occurrence, and reducing the effects of uncontrollable accidents. Operational/handling precautions, procedures, and requirements at hazardous facilities and hardware design reviews for critical equipment is essential. Strict safety measures must be implemented."*

Soil contamination resulting from transportation spills is unlikely to occur because *"...the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product and either cover the spill with foam, plastic, etc., or remove it (Volume I, page 5-45)."* Thus, all contaminated soil will be removed from the accident site.

Comment: *The risks of the project outweigh the benefits.*

Response: The EIS is intended to provide factual data to be used as the basis for making informed decisions. The acceptability or non-acceptability of the impacts disclosed in the dEIS--and the efficacy of the mitigating measures presented--is left to be determined by legislative and regulatory bodies and the community.

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attachments

3. SUMMARY

The data in Tables 1 and 2, in general, show that where a ground level caustic focus or inversion propagation condition occurs, higher altitude sources would tend to produce gradient propagation conditions or defocusing conditions to ground level sites. In particular, where strong low-altitude inversions occur at low elevation sites such as Punaluu and Naalehu, the higher altitude source energy is deflected away from the ground and defocusing occurs. Conversely, where strong low-altitude gradient conditions occur at low elevation sites, higher altitude source energy is refracted toward the ground, and possible caustic focusing or inversion conditions may result. Some sensitive sites are located within an acoustic waveguide which persists for most of the weather conditions studied (e.g., Mauna Loa Sanctuary, Azimuth = -10° to -20°). These sites may expect the amplification to occur, in general, but the greater distance of these sites from the source may prevent the acoustic energy from reaching significant levels.

Lastly, some site/weather condition combinations produce sonic velocity profiles that may change, from gradient to caustic or inversion conditions, with only slight variations in weather conditions. These situations are noted accordingly.

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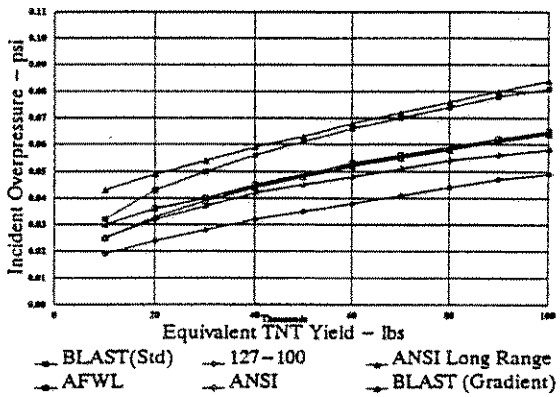
COMPARISON OF OVERPRESSURE ATTENUATION MODELS (FUNCTION OF YIELD)

Range R			Yield W	Scaled Range	Overpressure (Delta P) from Various Models (1)					
					BLAST Stand.	BLAST Grad.(2)	127–100	AFWL	ANSI	ANSI Long R(3)
(m)	(ft)	(miles)	(lbs)	(R/W^.33)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)
5700	18588	3.52	10000	865	0.032	0.025	0.019	0.030	0.025	0.043
5700	18588	3.52	20000	687	0.043	0.033	0.024	0.036	0.032	0.049
5700	18588	3.52	30000	600	0.050	0.039	0.028	0.040	0.037	0.054
5700	18588	3.52	40000	545	0.056	0.044	0.032	0.045	0.042	0.059
5700	18588	3.52	50000	506	0.061	0.048	0.035	0.049	0.045	0.063
5700	18588	3.52	60000	477	0.066	0.052	0.038	0.053	0.048	0.068
5700	18588	3.52	70000	453	0.070	0.055	0.041	0.056	0.051	0.072
5700	18588	3.52	80000	433	0.074	0.058	0.044	0.059	0.054	0.076
5700	18588	3.52	90000	418	0.078	0.061	0.047	0.062	0.056	0.080
5700	18588	3.52	100000	402	0.081	0.064	0.049	0.065	0.058	0.084

Notes: (1) Surface burst.
(2) For wind delta V in the model equal to zero.
(3) Developed for large yields and long ranges (>100 KM)



Revised Table 5-1. UNIT RISK AND SLOPE FACTORS USED IN THIS ANALYSIS

Substance	Inhalation Unit Risk (µg/m3)-1	Inhalation Potency Value (mg/kg/day)-1	Oral Potency Value (mg/kg/day)-1
1,1-Dimethylhydrazine (UDMH)	4.90E-04	1.72E+00	
Hydrazine	4.90E-03	1.72E+01	3.00E+00
Nitrogen Dioxide (NO2)			
Formaldehyde dimethylhydrazine (FDH)	4.90E-04	1.72E+00	
Nitrosodimethylamine (DMNA)	1.40E-02	4.90E+01	5.10E+01

Revised Table 7-14. CHRONIC HAZARD INDEX DUE TO RELEASE OF HYDROGEN CHLORIDE AND ALUMINUM OXIDE DURING A NORMAL LAUNCH

Rec. #	Receptor Name	Wind Bearing	WEATHER CASE							
			KONA (Worst case)	TRADE 1	TRADE 2	WEAKTR	KONA	TRAN1	TRAN2	NOCTORN
1	Aloha Montessori Preschool	58	4.26E-01	3.25E-01	2.97E-01	3.06E-01	3.97E-01	3.29E-01	3.14E-01	3.72E-01
2	Creative Day Preschool Inc.	137	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
3	Keauhou Day Care - Kona	132	5.44E-02	3.46E-02	2.59E-02	2.64E-02	4.68E-02	3.36E-02	2.97E-02	4.25E-02
4	Head Start Kailua	134	4.53E-02	2.83E-02	2.05E-02	2.25E-02	3.86E-02	2.77E-02	2.38E-02	3.50E-02
5	Head Start Ka'u Home Base	58	4.21E-01	3.21E-01	2.92E-01	3.02E-01	3.91E-01	3.25E-01	3.10E-01	3.67E-01
6	Kamehameha Schools	128	5.55E-02	4.26E-02	3.26E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
7	Kona Baptist Kaikkand	131	5.53E-02	3.52E-02	2.62E-02	2.67E-02	4.75E-02	3.39E-02	3.01E-02	4.29E-02
8	Kona Hongwanji Preschool	129	6.09E-02	3.94E-02	2.99E-02	3.24E-02	5.28E-02	3.81E-02	3.43E-02	4.77E-02
9	Mokuaikaua Church Nursery School	134	4.50E-02	2.80E-02	2.02E-02	2.22E-02	3.83E-02	2.68E-02	2.34E-02	3.41E-02
10	Pahala Preschool	143	7.67E-01	6.43E-01	6.42E-01	6.53E-01	7.53E-01	7.03E-01	7.01E-01	6.12E-01
11	Pali Ulli Waldorf School	128	6.34E-02	4.12E-02	3.12E-02	3.38E-02	5.51E-02	4.00E-02	3.58E-02	4.97E-02
12	Salvation Army Ohana Keiki Day Care Center	134	4.53E-02	2.83E-02	2.05E-02	2.25E-02	3.86E-02	2.77E-02	2.38E-02	3.50E-02
13	University of the Nations	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
14	Sherry Alves	128	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.67E-02	4.11E-02	3.67E-02	5.12E-02
15	Maija Abeya	136	4.33E-02	2.70E-02	1.92E-02	2.12E-02	3.68E-02	2.58E-02	2.24E-02	3.31E-02
16	Trina Alapai	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
17	Joann Bisnow	128	6.55E-02	4.26E-02	3.26E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
18	Dawn Bradford	137	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
19	Keiki Corner	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
20	Lucy Delanes	136	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
21	Cammy Featherstone	133	4.95E-02	3.12E-02	2.29E-02	2.49E-02	4.20E-02	3.01E-02	2.67E-02	3.79E-02
22	Nancy Fujimoto	133	5.04E-02	3.15E-02	2.32E-02	2.52E-02	4.29E-02	3.04E-02	2.70E-02	3.86E-02
23	Pat Gibson	138	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
24	Chris Hagerman	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
25	Kathy Lossasso Hanson	138	4.48E-02	2.77E-02	1.99E-02	2.19E-02	3.80E-02	2.65E-02	2.31E-02	3.38E-02
26	Sandra Hanson	136	4.25E-02	2.61E-02	1.89E-02	2.09E-02	3.58E-02	2.50E-02	2.21E-02	3.23E-02
27	Debbie Hedemann	129	6.55E-02	4.26E-02	3.26E-02	3.51E-02	5.70E-02	4.14E-02	3.70E-02	5.15E-02
28	Linda Hester	138	4.48E-02	2.77E-02	1.99E-02	2.19E-02	3.80E-02	2.65E-02	2.31E-02	3.38E-02
29	Mama Kin In	136	4.33E-02	2.70E-02	1.92E-02	2.12E-02	3.68E-02	2.58E-02	2.24E-02	3.31E-02
30	B.J. Lemman	137	3.98E-02	2.44E-02	1.72E-02	1.92E-02	3.32E-02	2.33E-02	2.04E-02	3.00E-02
31	Kristen Leorna	130	5.28E-02	3.37E-02	2.49E-02	2.74E-02	4.51E-02	3.26E-02	2.87E-02	4.10E-02
32	Barners Legg	139	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
33	Gail McLeod	136	3.68E-02	2.38E-02	1.68E-02	1.85E-02	3.25E-02	2.28E-02	1.97E-02	2.94E-02
34	Lydia Pace	138	4.08E-02	2.51E-02	1.79E-02	1.99E-02	3.44E-02	2.40E-02	2.11E-02	3.12E-02
35	Irma Pittmeister	137	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
36	Debbie Sass	138	4.08E-02	2.51E-02	1.79E-02	1.99E-02	3.44E-02	2.40E-02	2.11E-02	3.12E-02
37	Jill Terwilliger	134	4.70E-02	2.93E-02	2.15E-02	2.35E-02	4.02E-02	2.67E-02	2.46E-02	3.60E-02
38	Alma Vegas	139	4.04E-02	2.48E-02	1.78E-02	1.95E-02	3.40E-02	2.38E-02	2.07E-02	3.04E-02
39	Loren Victorino	128	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.67E-02	4.11E-02	3.67E-02	5.12E-02
40	Angela Walton	135	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
41	Jack Walton	142	3.92E-02	2.41E-02	1.69E-02	1.89E-02	3.29E-02	2.30E-02	2.01E-02	2.97E-02
42	Pam Yamashita	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
43	Hawaii Preparatory Academy, Kona Campus	131	5.57E-02	3.55E-02	2.66E-02	2.91E-02	4.78E-02	3.43E-02	3.04E-02	4.32E-02
44	Hawaii Preparatory Academy, South Kona	126	6.34E-02	4.12E-02	3.12E-02	3.38E-02	5.51E-02	4.00E-02	3.58E-02	4.97E-02
45	Henry Opukahaia School, Kona Campus	137	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
46	Holualoa School	135	4.95E-02	3.12E-02	2.29E-02	2.49E-02	4.20E-02	3.01E-02	2.67E-02	3.79E-02
47	Honaunau School	128	7.37E-02	4.87E-02	3.76E-02	4.06E-02	6.47E-02	4.74E-02	4.26E-02	5.83E-02
48	Hookena School	120	8.13E-02	5.46E-02	4.26E-02	4.61E-02	7.16E-02	5.31E-02	4.82E-02	6.50E-02
49	Kealakehe Elementary School	133	4.79E-02	3.02E-02	2.19E-02	2.39E-02	4.10E-02	2.91E-02	2.57E-02	3.69E-02
50	Kau High & Pahala Elementary School	143	7.68E-01	6.54E-01	6.52E-01	6.66E-01	7.68E-01	7.16E-01	7.08E-01	6.19E-01
51	Keaiakehe Elementary School	138	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
52	Keaiakehe Intermediate School	138	4.37E-02	2.73E-02	1.95E-02	2.15E-02	3.71E-02	2.62E-02	2.26E-02	3.35E-02
53	Kona Adventist School	128	6.71E-02	4.41E-02	3.36E-02	3.66E-02	5.85E-02	4.29E-02	3.85E-02	5.31E-02
54	Konaweena Elementary School	129	6.22E-02	4.08E-02	3.08E-02	3.31E-02	5.39E-02	3.93E-02	3.50E-02	4.85E-02
55	Konaweena High & Intermediate School	129	6.22E-02	4.08E-02	3.08E-02	3.31E-02	5.39E-02	3.93E-02	3.50E-02	4.85E-02
56	Naalehu School	57	4.24E-01	3.23E-01	2.95E-01	3.05E-01	3.95E-01	3.28E-01	3.12E-01	3.70E-01
57	Ocean View Estates School	79	1.47E-01	1.02E-01	8.49E-02	8.98E-02	1.32E-01	1.00E-01	9.30E-02	1.19E-01
58	University of Hawaii	129	6.06E-02	3.90E-02	2.96E-02	3.21E-02	5.24E-02	3.78E-02	3.39E-02	4.74E-02
59	University of the Nations	134	4.66E-02	2.90E-02	2.12E-02	2.32E-02	3.96E-02	2.84E-02	2.45E-02	3.57E-02
60	Kau Hospital	147	7.67E-01	6.43E-01	6.42E-01	6.53E-01	7.53E-01	7.03E-01	7.01E-01	6.12E-01
61	Kona Hospital	130	6.09E-02	3.94E-02	2.99E-02	3.24E-02	5.28E-02	3.81E-02	3.43E-02	4.77E-02
62	Hillhaven Kona Healthcare Center	131	5.24E-02	3.34E-02	2.45E-02	2.71E-02	4.48E-02	3.22E-02	2.85E-02	4.07E-02
63	Kona Adult Day Care Center	128	6.51E-02	4.23E-02	3.22E-02	3.48E-02	5.67E-02	4.11E-02	3.67E-02	5.12E-02
64	Puneluu Restaurant	77	7.91E-01	6.56E-01	6.54E-01	6.67E-01	7.71E-01	7.18E-01	7.09E-01	6.20E-01
65	Puneluu Condos	75	8.14E-01	6.68E-01	6.65E-01	6.81E-01	7.87E-01	7.31E-01	7.17E-01	6.27E-01
66	Puneluu Beach Park	73	7.97E-01	6.59E-01	6.57E-01	6.71E-01	7.75E-01	7.21E-01	7.11E-01	6.21E-01

Maximum occurs at Puneluu Condos under Kona (worst case) scenario 8.27E-01

Revised Table 8-69. CUMULATIVE IMPACTS OF CONFLAGRATION AND DEFLAGRATION: CANCER RISK

	ON-PAD CONFLAGRATION	DEFLAGRATION	CUMULATIVE
Pahala	0	4.3E-07	4.3E-07
Naalehu	0	1.5E-07	1.5E-07
Captain Cook	0	2.5E-08	2.5E-08

	CONFLAGRATION DURING VEHICLE ASCENT	DEFLAGRATION	CUMULATIVE
Pahala	0	4.3E-07	4.3E-07
Naalehu	0	1.5E-07	1.5E-07
Captain Cook	0	2.5E-08	2.5E-08

C-1

JOHN WAIHEE
GOVERNOR

BRIAN J. J. CHOY
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November 18, 1993

Mr. Mufi Hannemann, Director
Department of Business, Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Hannemann:

Subject: Draft Environmental Impact Statement for the Conceptual Plan for the Commercial Satellite Launching Facility at Palima Point, Kau, Hawaii

Thank you for the opportunity to review the subject draft environmental impact statement. We do not have any comments to offer.

Sincerely,

Brian J. J. Choy

Brian J. J. Choy
Director

BC:jt

12-99

Comments on the dEIS for the Proposed Commercial Rocket Launching Facility in Kau
Volume III: Geologic Hazards, and Seismic Risk Assessment

The location of the proposed commercial rocket launching facility (spaceport) at Palima Point in Kau, Hawaii appears to be a very poor choice, in view of the extremely high risks from both volcanic and earthquake hazards. Although the dEIS makes a commendable attempt at describing these hazards, it tends to gloss over or downplay many aspects of the dangers.

In the section on Geologic Hazards, the dEIS briefly describes certain hazards, but neglects to elaborate on the implications. For example, after acknowledging that Kilauea's southewest rift zone runs through the proposed spaceport location, it tones down the definition of a rift zone to a fracture "where near-vertical dikes have transported magma to the surface;" a description whose tense clearly suggests only past activity. And, although the word "transport" is technically correct, to an EIS reader who is not a geologist (such as developers, politicians, and the general public), the connotation is very different from that of "eruption," "fire fountain," or "curtain of fire;" these concrete words are noticeably absent. This is undoubtedly because it is more pleasant to think of magma being transported to the surface than to envision cascades of molten lava gushing out of the Great Crack and pouring over the launch facilities. The report compares speeds of aa and pahoehoe at other parts of the island, but fails to provide graphic details of what would happen if an eruption actually occurred at the SWRZ near the facilities. Would lava flows cut off access toads to the site? Might molten lava have an adverse effect on cylinders of propellant? How quickly could lava-induced fires spread to storage facilities containing toxic chemicals? Could all the hazardous chemicals be removed in time in advance of surging lava flows?

In mentioning the danger from ash and tephra, the report pointed out that in 1990, Puu Oo's eruption sent these particles as far away as Naalehu. However, aside from acknowledging that "moving parts of machinery may be clogged or abraded," the report does not make the connection between clogged machinery and the increased likelihood of accidents therefrom, nor the increased maintenance expense to launch companies. Similarly, only a short paragraph explains that "sulfuric acid can be blown downwind;" in fact, sulfuric acid is being blown downwind, and has been for nearly a decade, from Puu Oo right over the proposed spaceport site. No in-depth discussion is made of the effects of sulfuric acid on the facility, such as the economic feasibility of exposing buildings, launch towers, and rockets to the fumes, and nothing at all is said of the effects of sulfuric acid mixing with gases released during launches.

The report acknowledges that topographically high areas are not necessarily safe in the event of base surges. It accurately explains that the proposed spaceport location is in an area of subsidence and faulting, which can damage structures as a result of tilting or differential settlement. However, after stating that some scarps are masked by young lava flows, it fails to make the connection that this masking may cause a casual observer to underestimate the true nature of the area. The report pointed out that the 1868 earthquake, of magnitude 7 or 8, had its epicenter in the general vicinity of the proposed spaceport; in southern Hawaii, recurrence interval for earthquakes greater than 6.5 is stated to be about every 15-17 years.

In the section on Seismic Risk Assessment, the dEIS recognizes that the proposed spaceport location is near three active fault systems: Koae, Hilina, and Kaoiki-Honuapo. The report then goes on to accurately list many aspects of the seismic risk, admitting that the spaceport would introduce hazardous materials like rocket propellants into the region, which, if not contained during an earthquake, could pose great risk to the population. Groundwater resources near the site would be directly affected by seismic-induced hazards. Leakage from propellants could get into the groundwater and into the ocean. Hazard to pristine shoreline water would exist since pads are within a Critical Wastewater Disposal Area. Liquid oxygen poses a severe fire and explosive hazard, a problem which is compounded by the vegetation in the area, which is seasonally highly combustible. Explosions may scatter propellant and debris over wide areas. The worst-case scenario would be if there were an earthquake when the launch vehicle was fully loaded on the pad before lift-off; large quantities of fuel and oxidizer would be in close proximity and the vehicle would probably fall over, or slam against the tower, and puncture.

However, the dEIS then proceeds to unrealistically attempt to find ways to build the spaceport in such a seismically active area. It suggests that "perhaps" seismic isolation bearings, incorporating hard rubber, could be used in the launch pad; "some preliminary research has been done in this area." One tends to feel uncomfortable knowing that there has not been extensive, but only "some," and only "preliminary" research, not on the pads themselves but "in this area."

One of the more significant statements in the dEIS notes, "Fire fighting equipment must be kept out of garages if earthquake hazard is imminent to avoid trapping vehicles inside jammed garage doors (as happened in San Fernando, CA, 1971)." This suggests that the author is not a seismologist, for as of this writing, the basic problem with regards to earthquakes is that no one knows when they are imminent; if they were predictable, no one would ever get hurt, because everyone could be evacuated in advance. The implication of this statement, that fire trucks could be brought outside of garages when scientists phone up the spaceport facility to warn of imminent earthquake hazard, is preposterous. To deliberately allow such a misleading sentence to be placed in the dEIS, knowing it would be read by developers, politicians, and the public (all who are non-geophysicists) is appalling.

The report then goes on to explain, "Special all-terrain equipment may be necessary to access rugged areas of the facility should regular roadways be disrupted by ground failure and displacement." Any such ground failure and displacement is surely going to do more than disrupt roads; most likely, it will result in fires, explosions, and spills of toxic chemicals as described earlier. Will ATV's be able to carry enough fire-fighting material over the rugged terrain to handle the worst-case scenarios? Will ATV's be able to move fast enough over the enormous distances to prevent catastrophe? Also, one would hope the special all-terrain equipment did not happen to be caught inside the jammed garage doors.

The report states that it is likely that several moderate earthquakes of magnitude 5.5-6.6 will occur within the 50-year lifespan of the proposed spaceport. Knowing that *several* earthquakes, not just one or two, of *moderate* (not small) size *will* likely occur within the lifespan of the spaceport, one might begin to think this is not such a good place to be storing hazardous, explosive, and combustible materials

The Seismic Risk Assessment sums up its analysis with the following suggestions: Locate hazardous facilities (which store, transfer, or contain hazardous materials) away from known geologic hazards, such as fault zones, volcanic rift zones, and areas of coastal subsidence. Locate them away from population centers and roads.

There is no place on the island of Hawaii that meets all of these requirement, but of all the possible places, Palima Point is absolutely the worst, for it contains known geologic hazards, including fault zones, volcanic rift zones, and areas of coastal subsidence, besides being near population centers and roads. Therefore, the proposed commercial rocket launching facility in Kau appears to pose such a great risk to life, property, and the environment that it should not be developed.

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SEP. 30 1994

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Hilo, HI 96720-4091

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Bevens:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc. contributed to the following responses.

Comment: *The depictions of the effects of lava flows, earthquakes and other natural hazards on the launch facility are not sufficiently graphic. What would be the effect of lava flows on access roads, cylinders of propellant, and storage facilities containing toxic chemicals?*

Response: We agree that the description of the Great Crack would be improved by adding that it represents an eruptive center where lava poured onto the surface and flowed outward, generally downslope and to the sea. The presence of littoral cones (Pu`u Pili)--as described in Volume III, Appendix A of the dEIS--at the Palima Point site also supports the conclusion of explosive activity, though generally associated with the interaction with seawater as the lava flows into the sea. A definition from Macdonald and others 1983) follows:

> *Rift Zones (like the Great Crack) - are laterally extensive zones of fissures that provide passageway for rising magma; "at the surface rift zones are marked by many open cracks, from some of which lava has poured out, by collapse craters, and by spatter cones and rarely cinder cones and long low spatter ramparts."*

Although such spectacular eruptive patterns like "curtains of fire" or "fire fountains" are common during eruptions from Kilauea Caldera and along the East Rift of Kilauea, it is inappropriate to speculate (in the context of an environmental impact statement) that these patterns would also occur during an eruption in the vicinity of the proposed launch facility on the Southwest Rift Zone (where such eruptions are rare). The dEIS did recount the speed of the 1823 lava flow which came closest to the proposed facility (Volume I, pages 3-14, 4-1 and 4-2):

> *"the 1823 flow from the southwest rift zone was said to have moved so quickly that a coastal Hawaiian village was overwhelmed (Macdonald and others, 1986)."*

Furthermore, according to Macdonald and others (1983), the 1823 eruptions from the Great Crack in the vicinity of Palima Point were relatively quiet, although quite rapidly flowing -

> *"lava rose in the crack to the surface and welled out quietly, with almost no explosion. Even spattering was very slight....The lava was very fluid and flowed rapidly, sweeping high up onto the slopes of a ground of older spatter cones (now called the Lava-Plastered Cones) before rushing on to the ocean. It is said (although it has never been documented) that the flow came so fast that the people of a village in its path could not launch their canoes in time to save them, and that a few old people and small children could not run fast enough to escape."*

The dEIS sought to report potential adverse effects in a factual manner with documented references. Because every attempt was made to avoid conjecture and speculation, the descriptions may not be as graphic as those that would occur in a news article or in a discussion among peers.

The dEIS also recognizes that inundation by lava would result in catastrophic destruction of the launch facility. Such occurrence would effectively shut down the launch facility permanently. As stated in the dEIS, Volume II, page 8-4:

> *"If the lower Southwest Rift Zone of Kilauea should erupt, however, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."*

Comment: *There is no in-depth discussion of the effects of sulfuric acid on the facility, such as the economic feasibility of exposing buildings, launch towers, and rockets to the fumes, and nothing at all is said of the effects of sulfuric acid mixing with gases released during launches.*

Response: Acid rain and vog (volcanic smog) are described in Volume I, Chapter Five of the dEIS. They are well recognized hazards on the Island of Hawaii, causing respiratory problems for sensitive people. Acid rain is a local environmental problem that already exists - whether or not a spaceport is constructed in the area - due to the volcanic activity on the island. Although effects of these corrosive deposits on metal and other industrial equipment were not specifically addressed in the dEIS, acid rain would be considered in the design and operation of the spaceport in terms of maintaining equipment and facilities in good operating condition.

Both Cape Canaveral AFS and Vandenberg AFB are experienced with corrosion problems as both are located along coastlines in middle latitudes where salt spray is abundant. Furthermore, because space launch vehicles carry highly corrosive rocket fuels they are designed to withstand these corrosive reagents. Components of gases emitted from rocket exhaust include HCl, which forms acidic droplets when mixed with the pad cooling flush water. Consequently, launch pads are designed to withstand acidic rain, and are maintained accordingly. Washdown of facilities and careful maintenance is required to withstand the effects of the corrosive atmosphere at CCAFS; similar procedures would necessarily be applied at Palima Point. Vandenberg AFB has had a Corrosion Control Program in continuous operation, led by a Corrosion Control Engineer who specified appropriate paints, schedules for sand-blasting and painting, washdowns, and so forth to keep the facilities in good condition. The cost of maintenance and operation of the Palima facility to combat corrosion should be comparable to that at Cape Canaveral and Vandenberg.

Comment: *The seismic hazards at the site are large and the mitigations suggested are unrealistic.*

Response: The purpose of the dEIS is to assess the hazards in a preliminary manner and provide suggestions for possible mitigations. It is beyond the scope of this work to provide more detailed analyses and recommendations regarding construction and implementation of actual mitigations. Such analyses are appropriate if the site were deemed appropriate for the proposed development and work progresses into actual planning and construction. By the time planning reaches the point that actual design and construction would begin, several years of continued research in earthquake engineering will have occurred. Seismic isolation for large structures is an active area of research that recently received a major test during the 17 January 1994 Northridge earthquake. Thus, it is likely that such designs--which have already been implemented in a number of structures throughout the U.S. and Japan--will have been evaluated and tested to the extent that a careful engineering seismic risk analysis can be undertaken, as specifically recommended in Volume III, Appendix A of the dEIS:

> *" A complete and comprehensive seismic risk analysis is recommended as a means of qualifying and systematically evaluating seismic risks and mitigation alternatives. Such an approach requires detailed risk modeling and analysis which is beyond the scope of this report. A complete seismic risk analysis must be based on a detailed design of the facility, which begins with the specification of seismic design criteria as suggested herein. Facility layout and design-type mitigations are employed during the design phase to limit earthquake-related risks. Additional risk mitigation opportunities are available in the specification of normal and emergency operating procedures."*

Comment: *The basic problem with regards to earthquakes is that no one knows when they are imminent; .... The implication ... that fire trucks could be brought outside of garages when scientists phone up the spaceport facility to warn of imminent earthquake hazard, is preposterous. To deliberately allow such a misleading sentence to be placed in the dEIS, knowing it would be read by developers, politicians, and the public (all who are non-geophysicists) is appalling.*

Response: The statement referred to is one aspect of the earthquake response plan in the State of California. An elaborate Earthquake Advisory Plan has been implemented by the State of California Office of Emergency Services (California Earthquake Advisory Plan, 1990) based on the successful prediction (more appropriately "forecast") of earthquakes in several instances around the world. In the mitigations section, this plan states:

> *Move emergency vehicles out of garages or apparatus bays, or at least keep bay doors open. If feasible, move vehicles from dangerous locations to non-hazardous open areas.*

We certainly recognize the unpredictability of earthquakes as stated on page 20 of the seismic risk report.."*A primary difference between volcano and earthquake risks is*

that volcanic activity is more predictable." Because most earthquakes on the Island of Hawaii are associated with volcanic activity, the large damaging earthquakes are usually preceded by significant foreshock activity. A period of unusual seismic activity preceded the April 2, 1868 Great Ka`u earthquake including several moderate foreshocks (beginning as early as March 9, 1868, with a swarm beginning on March 17, 1868, Cox and Morgan, 1977). Significant foreshocks, including a M_S=5.7 event, were also felt prior to the November 29, 1975 Kalapana earthquake. Thus, when seismologists at Hawaii Volcanoes Observatory (HVO) record enhanced seismic activity associated with magma upwelling, inflation or deflation, etc., an earthquake watch and warning system (such as implemented in California) could be engaged whereby an imminent earthquake hazard could be recognized. Hawaii is fortunate that magma movement and possible large earthquakes are associated with such precursory activity. Volcanic eruption and earthquake advisories are possible!

Although false alarms may be unavoidable, the simple mitigating procedures suggested in the dEIS (such as leaving fire suppression equipment outdoors, or garage doors open on fire stations) would have negligible adverse consequences on regular activities at the spaceport or in the affected communities. All disaster response or preparedness plans in Hawaii should consider these simple mitigation measures which could save lives and property.

Hawaii is one place in the entire world where anticipation of damaging earthquakes based upon premonitory seismicity (or other precursory phenomena like ground uplift and subsidence) is likely to occur. Historical records of seismicity patterns have already been used successfully to predict major eruptions of volcanoes, including Mt. Saint Helen in Washington state, Mt. Pinatubo in the Philippines and Kilauea in Hawaii.

Comment: *Will ATV's be able to carry enough fire-fighting material over the rugged terrain to handle the worst-case scenarios? Will ATV's be able to move fast enough over the enormous distances to prevent catastrophe?*

Response: Helicopters and other aircraft are routinely used to fight fires in areas of rugged terrain and would be suitable for such activity on the Island of Hawaii, along with ATVs. Aircraft can cover several miles within minutes, and use the ocean as a convenient local source of water for fire suppression in an emergency. Other possible mitigations would be to store and maintain flexible hoses and pumps in the area that could be used to bring seawater into the area for fire suppression, as done in the Marina district of San Francisco following the 1989 Loma Prieta earthquake when the underground water supply lost pressure due to ground failure-induced pipe breaks.

Comment: *Palima Point is an inappropriate site for a spaceport. Knowing that several earthquakes, not just one or two, of moderate (not small) size will likely occur within the lifespan of the spaceport, one might begin to think this is not such a good place to be storing hazardous, explosive, and combustible materials.*

Response: Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire Island of Hawaii. As stated in Volume III, Appendix A of the dEIS, the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard - albeit without a formal, quantitative risk analysis - so that the appropriate decision-makers could decide whether or not to continue to pursue the launch site initiative.

The dEIS states the hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the proposed project were to proceed. Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and--through their elected representatives--members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

References:

Macdonald, G.A., Abbott, A.T., and Peterson, F.L., "Volcanoes in the Sea: The Geology of Hawaii," 2nd Edition, University of Hawaii Press, Honolulu, 1986.

Morrow, J.W., E.J. Morgan, A.N. Furuike, and T.A. Peters, 1991, Characterization of volcanic aerosol in two populated areas on the Island of Hawai'i: First year findings of a three-year investigation: presented at the Air & Waste Management Association 84th Annual Meeting and Exhibition, Vancouver, British Columbia, 16-21 June.

"California Earthquake Advisory Plan", and "California Short-Term Earthquake Prediction Response Plan", Governor's Office of Emergency Services, Ontario, CA, October 1990

Cox, D. C., and Morgan, J., 1977, Local tsunamis and possible local tsunamis in Hawaii: Hawaii Institute of Geophysics Report HIG-77-14, p. 26-27.

NOV 2 2 1993

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Office of the Director

November 19, 1993

The Honorable John D. Waihee III
Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, HI 96813

Dear Governor Waihee:

Subject: Draft Environmental Impact Statement – Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point

We have reviewed the subject draft EIS, particularly as it pertains to the impact on the astronomical observatories on Mauna Kea. We offer the following comments for consideration.

We agree that the three most serious potential impacts on the Mauna Kea Observatories (MKO) are those discussed in Chapter 5, Section V.A, namely:

(a) degradation of the naturally limited dark skies above Mauna Kea by scattering of light from the launch facilities and from night launches;

(b) interference with observatory operations by harmful radio frequency interference (RFI);

(c) obscuration of the sky by rocket exhaust plumes.

We address each of these concerns and the associated proposed mitigation separately.

Sky Brightening

The model calculations have been done by a world expert in this field. We concur with the conclusion that outdoor lighting at the facility is unlikely to produce significant impacts on the MKO, provided that:

(i) the lighting inventory used in the model is accurate;

(ii) all proposed mitigation measures listed on page 5-156 are strictly adhered to;

(iii) the mitigation is tightened so that temporary as well as permanent outdoor lighting must conform to the Hawaii County Lighting Ordinance.

If and when the launch facility moves beyond the conceptual phase, the lighting inventory must be closely monitored to ensure that it does not differ significantly from that assumed in the model calculation and that all outdoor lighting, both permanent and temporary, conforms fully with the Hawaii County Lighting Ordinance. The Final EIS must contain this stipulation.

Radio Frequency Interference (RFI)

The draft EIS indicates the strong potential for serious radio frequency interference (RFI) unless strict planning and mitigation measures are followed. For example, the metric radar, assuming it were located at the launch facility and the beam directed at the MKO, would exceed the threshold for harmful RFI at optical and infrared telescopes by a factor of 100 (20 dB). The same radar, if it were located at Cape Kumukahi and directed toward the MKO would exceed this threshold by a factor of 2,500,000 (64 dB)! The situation for radio telescopes on Mauna Kea is just as severe. In order to avoid a serious RFI impact at the MKO, it is essential that the proposed mitigation be strictly enforced. Radar installations will require sector blanking, a significant amount of terrain shielding, side lobe energy control and rigorous frequency management. Actual measurements of radar signal propagation will be necessary to establish acceptable locations and operating parameters. Ongoing coordination with the Institute for Astronomy is mandatory.

Obscuration by Exhaust Plumes

The draft EIS indicates that obscuration of the sky by exhaust plumes is a potentially serious problem if launches occur during adverse wind conditions. Of particular concern are southerly upper-level winds which would transport the plume back over the observatories. The proposed mitigation, which is simply to monitor the winds and not launch in unfavorable conditions, could be acceptable. Unfortunately, however, the draft EIS does not present statistics on how often these unfavorable conditions are present. Hence it is not possible to assess the impact that the mitigation would have on launch facility operations. How difficult and expensive would it be to measure the winds? Would

launches be delayed for days or weeks because of the winds--and if so, how often? We are concerned that the launch facility might not be viable with the proposed wind restrictions. In order for this issue to be adequately assessed, both with regard to the impact on astronomy and the impact on launch facility operations, much more information is needed on the statistics of exhaust plume evolution and transport. The Final EIS must include much better data on the speed and direction of upper level winds as well as expanded analysis based on these data. The draft EIS takes a first step in demonstrating how to model plume transport given the wind data, but it does not contain the statistical data and analysis that are essential in order to judge the feasibility of the proposed mitigation.

Thank you for the opportunity to comment on the draft EIS.

Yours sincerely,

Donald N.B. Hall
Director
Institute for Astronomy

cc: Takeshi Yoshihara (DBEDT)
Ralph Horii (UH)
Mauna Kea Directors

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SEP. 30 1994

Dr. Donald N.B. Hall
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SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Dr. Hall:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Engineering-Science, Inc. contributed to the following responses:

Comment: *If and when the launch facility moves beyond the conceptual phase, the lighting inventory must be closely monitored to ensure that it does not differ significantly from that assumed in the model calculation and that all outdoor lighting, both permanent and temporary, conforms fully with the Hawaii County Lighting Ordinance. The Final EIS must contain this stipulation.*

Response: The first item of the Summary of Mitigation Measures to Prevent Deterioration of the MKO Site (DEIS Volume I, page 5-156) will be revised as follows:

> All temporary and permanent outdoor lights at the launch facility will conform with the Hawaii County Lighting Ordinance. The lighting inventory will be closely monitored to ensure that it does not differ significantly from that assumed in the EIS.

Comment: *In order to avoid a serious RFI impact at the MKO, it is essential that the proposed mitigation be strictly enforced. Radar installations will require sector blanking, a significant amount of terrain shielding, side lobe energy control and rigorous frequency management. Actual measurements of radar signal propagation will be necessary to establish acceptable locations and operating parameters. Ongoing coordination with the institute for Astronomy is mandatory.*

Response: We recognize your concerns. The third item of the Summary of Mitigation Measures to Prevent Deterioration of the MKO Site (DEIS Volume I, page 5-156) will be revised as follows:

> Terrain shielding and management of radiated power level, sector blanking, sidelobe energy control, frequency coordination and reduction of out-of-band emissions will be implemented to reduce the potential for radio frequency interference to acceptable levels as specified by the International Astronomical Union for optical/IR telescopes (power density less than $2.\mu W/m^2$) and as specified by the National Radio Astronomy Observatory for radio telescopes. These mitigations will be strictly enforced.
>
> As the Spaceport moves to the design phase, continued coordination with UH IfA will be mandatory and enforced. Actual measurements of radar signal propagation will be necessary to establish acceptable locations and operating parameters. Guidelines for the location and operation of range instrumentation systems will be made in coordination with and approved by the UH Institute for Astronomy.

Comment: *The draft EIS indicates that obscuration of the sky by rocket exhaust plumes is a potentially serious problem but does not present any statistics on how often unfavorable winds may be present that would carry the plumes back over the observatories. The final EIS must include much better data on the speed and direction of the upper level winds as well as an expanded analysis based on these data to judge the feasibility of the proposed mitigation measures.*

Response: An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis identified certain conditions where there is a relatively high probability of transport of a rocket plume into the field of view of the observatories. These conditions occurred during both south and east launch trajectories with the highest percentage of unfavorable wind directions occurring during an east launch. A copy of the report is attached.

The scope of the described analyses was limited to identifying the percentage of time favorable wind directions would be present. The wind direction analysis provides the first step in understanding the potential for favorable launch conditions. However, even with unfavorable wind directions, high wind speeds could produce adequate transport to clear the plume from the field of view within a short time. Further refinement of the analyses to include the wind speed and the correlation between winds at different altitudes is left to future tasks in the event the project moves forward.

The new results described in the attached report provide information not available during the preparation of the draft EIS. The analysis suggests that it may be possible to modify the mitigation to increase the probability of favorable launch windows without compromising astronomical observations. Specifically, it might be acceptable to replace the prohibition against launches when there is a southerly wind component with a stipulation that ..."there will be no launches when the wind would carry the plume above a specified elevation (e.g. 30 degrees) at any time, as view from the observatories." Also, the requirement that the plume be transported out of the field of view (sky above 15 degrees elevation) within two hours of launch might possibly be replaced with a requirement that ..."the plume must not be in the field of view for longer than two hours." This would mean that the two-hour clock would not necessarily have to start at launch.

We fully understand that obscuration by plumes is a potentially serious problem for which the currently proposed mitigation (as stated in Chapter Five of the dEIS) is believed to be adequate. We would not request a change in these mitigating measures at the present time. In the event the project moves forward, however, and refined analysis--as mentioned above--is carried out, we would like to give a potential developer the option of presenting possible changes in mitigation to UH IfA for approval.

attachment

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

17 October 1993

Comments on the draft EIS for the Conceptual Plan
for a Commercial Satellite Launching Facility at Palima Point

1) The final EIS needs to evaluate the impacts of the emissions from the sounding rockets. The total emissions from these rockets may be smaller than those from the orbital launch vehicles, but some of the sounding rockets emit substantial amounts of substances that are not emitted by the larger rockets. For example, the Terrier and Nike rockets emit 20.25 lb and 3.75 lb of lead respectively.
2) The reliabilities of the sounding rockets and past failures also need to be examined. In particular, the 20 Aug. 1991 Aries launch at Cape Canaveral (which went 90 degrees off-course) should be considered as a possible failure mode.
3) The debris dispersion needs to be calculated for launches that go off-course so that one can assess the requirements for the range safety.
4) The Delta failure rate of 12/201 implies that 21 failures are expected if there are 5 launches per year for 70 years. The expected number of Atlas failures in 350 launches over 70 years is 32 based on the failure rate of 10/110 from recent Atlas launches. Therefore, the assumptions of only one failure producing a conflagration and one producing a deflagration may be an underestimate.
5) Some of the commercial launches listed in Table 4-1 in Vol. VI, Appendix C are associated with military projects. The final EIS should examine to what extent similar military launches at Palima Point will conflict with non-military launches.
6) The disagreement between the ACTA report and the DBEDT OSI response on the overpressures and resulting effects from an Atlas IIAS explosion emphasizes the importance of getting detailed information about previous Atlas failures, including the 1965 failure at Cape Canaveral.
7) The carbon monoxide (CO) emissions estimated for Atlas IIAS, Delta II, and Taurus launches on page 5-85 of Vol. I add to over 100 tons, not 80 tons as indicated on page 5-86.
8) The calculated hydrogen chloride (HCl) concentrations are given as 30-min. average values. These need to be converted to the equivalent 60-min. average values to allow a direct comparison with the SPEGL values.
9) In various environmental documents for the Strategic Target System (STARS) launches on Kauai, the Hawaii HCl guideline is stated to be 0.025 ppm. This value is interpreted as an 8-hour average value. These documents assume a power law dependence and, using this methodology, determine 8-hour average values to be 0.57 times the 30-min. average values and 0.66 times the 60-min. average values. Converting the calculated 30-min. HCl average values using this power law time dependence implies that the Hawaii HCl guideline will be exceeded outside the Population Control Zone. The final EIS should discuss the Hawaii HCl guideline and the methodology to be used for converting 30-min. average values to 8-hour average values.
10) Some empirical data should be cited to support the assertion that nearly all carbon monoxide emitted by the rockets will oxidize to carbon dioxide.
11) REEDM version 7.03 used for the STARS EIS gave HCl and CO concentrations as close as 1000 m from the launch pad. Why are there no values closer than 3000 m in the draft EIS?
12) It is surprising that the HCl and aluminum oxide concentrations within 20 km of the launch pad that are predicted for a conflagration are smaller than those predicted for a normal launch. One would expect that a conflagration would produce a greater quantity of these combustion products below an altitude of 5000 feet than a normal launch. If so, then it seems that the greater heat in the conflagration must produce a more buoyant cloud of combustion products. The amount of buoyancy of this cloud apparently depends upon assumptions about the details of the conflagration. For example, the REEDM calculations done for the STARS EIS predict much greater HCl concentrations (within 10 km of the launch pad) for a conflagration than for a normal launch. To better evaluate the reliability of the REEDM predictions, it would be helpful to do the following:

a) make a detailed comparison of the quantities of combustion products produced below 5000 feet for a normal launch and for a conflagration
b) compare the predicted concentrations of HCl for a wind speed of 1 m/sec as used in the STARS EIS
c) compare quantitatively the REEDM predictions with data from previous launches

13) Even if all the debris from an explosion shortly after liftoff is contained within the population control zone (PCZ), it is possible that brush fires started by burning debris could spread to the propellant storage area within the PCZ or outside the PCZ. For example, the 15 June 1993 Minuteman I failure at Vandenberg Air Force Base started brush fires that burned 400 acres on and 600 acres off the base. The final EIS should examine the potential for brush fires from a similar failure at Palima Point.
14) The impacts, both localized and global, of the ozone depletion that will result from the HCl emitted directly into the stratosphere by solid-fuel rocket motors needs more discussion than the single paragraph on page 5-161 of Vol. I. In evaluating the significance of this ozone depletion, one should consider the global effort to phase out use of ozone-depleting substances and Hawaii laws which try to reduce ozone depletion by banning deliberate release of some ozone-depleting substances.

Michael Jones

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SEP. 30 1994

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SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Jones:

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Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc., KRP Information Services and Risk Science Associates contributed to the following responses.

Comment: *Assess impacts of emissions from sounding rockets.*

Response: Because the dEIS is based on a conceptual plan. All of the analyses assume that the sounding rockets will have solid rocket motors containing HTPB propellant, the most common solid propellant. Supplemental environmental analyses will be performed for specific vehicles if an actual project is planned. In any event, the impacts of the sounding rockets would be minimal compared to the impacts from the small and medium expendable launch vehicles quantitatively evaluated in the health risk assessment and other sections of the dEIS.

Comment: *The reliability of sounding rockets and past failures also need to be examined. In particular, the 20 Aug. 1991 Aries launch at Cape Canaveral (which went 90 degrees off-course) should be considered as a possible failure mode.*

Response: Vehicle performance history provides useful information for designing a range safety system to protect against all potential failure modes. While some sounding rockets do not carry a command destruct system, they are required to follow a ballistic trajectory established by the rail guiding launch system. All rockets equipped with a guidance and steering system must be equipped with a command destruct system. Accidents such as the Aries cited above would be anticipated and accounted for in the design of the range safety system.

Comment: *The debris dispersion needs to be calculated for launches that go off-course so that one can assess the requirements for the range safety.*

Response: The debris patterns shown in the dEIS are for breakup of a vehicle that is destroyed on-course. If the vehicle is destroyed while deviating from the planned trajectory, the size of the ellipses remain as shown, however, the centers of the ellipses move, reflecting the change in course. The destruct criteria will be designed such that the vehicle will be destroyed whenever this debris pattern moves across the Impact Limit Line. The Impact Limit Line is inside the Population Control Zone on land; it continues offshore north and south of the facility (See DEIS Volume I, Chapter Two). When conditions are such that the wind has the strength and direction to blow the debris on-shore, the vehicle will not be allowed to launch.

Comment: *The Delta failure rate of 12/201 implies that 21 failures are expected if there are 5 launches (per year) over 70 years. The expected number of Atlas failures in 350 launches over 70 years is 32 based on the failure rate of 10/110 from recent Atlas launches. Therefore, the assumptions of only one failure producing a conflagration and one producing a deflagration may be an underestimate.*

Response: Your conclusion is possibly true. The failure rates you cited, however, include any failure mechanism that prevents the payload from achieving the correct orbit. Also, most of the failures you cite occurred during the development stages of the Atlas and Delta. It should be noted, however, that only failures that result in a vehicle destruct below an altitude of 10,000 feet are considered as potentially capable of producing toxic hazards.

From 1960 to 1990 there were 12 failures in 201 launch attempts of Delta series launch vehicles. Of these 12 failures, only 4 were related to solid rocket motor failures in Stage 1 and affected the early phases of a launch. There has been only 1 Delta rocket failure since 1986; no Delta II vehicles have failed. The Atlas series of vehicles experienced 32 failures in 245 launch attempts from 1958 to 1990. Most of these failures occurred prior to 1965. From 1970 to 1980 there were 100 launches and 10 failures. On the basis of the conceptual plan launch schedule, it would not be unreasonable to expect more than one conflagration or deflagration type vehicle failures over a 15 year period.

The Health Risk Assessment (HRA) in Appendix VIIIA is based on the reasonable maximum exposure (RME) scenario specified by EPA in its "Risk Assessment Guidance for Superfund." This RME scenario is defined as the highest exposure that is reasonably expected to occur at a site. According to EPA RAGS, "The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures." Because exposures from conflagration or deflagration occur on a single event basis (and there is no way to predict when they will occur), the health effects are evaluated on the basis of a single exposure over a 70 year lifetime. Multiple exposures are easily derived by multiplying the single exposure risks by the number of exposures.

The HRA analyses are conservative overestimates because the effects of mitigating measures are not included. Launches will be constrained (held), if the meteorological conditions, in combination with the hazard of the accident, produce unacceptably high levels of toxicity to the nearby communities.

Comment: *Some of the commercial launches are associated with military projects. The final EIS should examine to what extent similar launches at Palima Point will conflict with non-military launches.*

Response: The proposed launch facility is intended solely for commercial use. Hawaii law prohibits the launching of destructive weapons from Palima Point. The military already has facilities to perform classified launches. Launch scheduling at the Hawaii spaceport is expected to be driven purely by market forces, not by whether the mission is funded by a military or a non-military interest.

Comment: *The disagreement between the ACTA report and the DBEDT OSI response on the overpressures and resulting effects from an Atlas IIAS explosion emphasizes the importance of getting detailed information about previous Atlas failures, including the 1965 failure at Cape Canaveral.*

Response: Accident frequency is very important in the consideration of launch risk. It should be noted that there has been no accident at either Vandenberg Air Force Base, Cape Canaveral Air Station of Cape Kennedy over the last 37 years (over 1100 orbital launches plus many ballistic missile launches) that has produced blast conditions such as those considered in this study. The assumption of an accident probability of 0.001 is probably conservative considering this history.

The disagreement between ACTA Inc. and OSI was about overpressures due to an accident producing a blast wave. There was a difference in professional opinion in that OSI believed that the overpressures that ACTA was predicting were too high and cited an Air Force Standard to support their position. ACTA's data was taken directly from a test program conducted at Cape Canaveral. Both positions are valid and it should be emphasized that these are models, based on assumptions. The major difference between the two approaches is in the assumptions. Section 11-200-16 of the EIS Rules states:

> *"In order that the public can be fully informed and that the agency can make a sound decision based upon the full range of responsible opinion on environmental effects, this statement must include responsible opposing views, if any, on significant environmental issues raised by the proposal."*

Publication of both the ACTA and OSI results fulfills this mandate. A discussion of the differences between the two approaches follows:

(1) The cited overpressure of 0.5 to 1.0 psi to break windows (Hazard Analysis of Commercial Space Transportation, OCST, 1988) is based upon 50 percent or more window breakage. The levels .05 to .5 psi examined by ACTA represent a smaller probability of breakage of glass. For instance, 500 broken windows in a community represents a very small percentage of the glass in the community (a house has typically 19 panes, 500 houses and corresponding businesses would have more than 10,000 panes), but prediction of 500 broken windows (ave. $P_{breakage} = .05$) in such a community can be the basis of a launch hold.

(2) The breakage probability curves included with the ACTA report were based on actual window strength measurements computed from glass sampled at Patrick AFB, Florida. The glass strength uncertainty is modeled with a Weibull distribution and the loading was based on an ideal blast pressure wave. The window responds dynamically and static fatigue is included in the model.

(3) The blast analysis is based on an explosion on the ground. The overpressures at distance predicted by the BLAST program were based on actual measurements made in a test program near Patrick AFB, Florida. They are higher at a distance than those in Air Force Manual-100 and other similar documents because the models used for the predictions in AFM-100 were based on Kingery and Pannill work using data from mid-continent tests (Suffield, Alberta, Canada)--where the atmosphere is more likely to be adiabatic with temperature decreasing from the ground (some of those tests were made on very hot days in August)--whereas the BLAST measurements were based in coastal areas where the atmosphere is maritime and typically has inversions that lead to higher overpressures at distances.

BLAST will predict higher overpressures at a distance in a maritime environment. This position is supported by work at the Air Force Weapons Lab, Sandia and the Defense Nuclear Agency. The consultant, ACTA, does not believe BLAST is conservative. Rather, according to ACTA, the single curve used universally, developed by Kingery and Pannill, underestimates overpressures at a distance and in a maritime environment. A table and figure are included at the end of this discussion showing a comparison of several models in predicting the overpressure from the spaceport to Pahala for a range of explosive yields (equivalent number of pounds of TNT).

BLAST, in general, models the phenomena probabilistically and no biases are included in the program to intentionally make it conservative. The only area of conservatism could be the selection of a TNT equivalency which is highly speculative to begin with. ACTA used AFM 127-100 or vehicle manufacturer information, because they believed that the high end of the TNT equivalencies in the OCST report were much too conservative.

No attempt was made in the ACTA study to establish the probability of an event leading to an explosion on the ground. It was merely stated that the probability was .001 or less. ACTA was directed to compute hazards, not risks. Evaluating the explosive blast impact without doing a risk analysis invariably leads to a more severe conclusion.

The "hazard only" approach was first recommended for launches from Cape Canaveral and Vandenberg AFB in the late 1970s. Using this approach it appeared that some vehicles would have very few days for launch. The risk approach (BLAST) considers the potential for local caustics, the locations of population centers, and computes the glass dynamic response. BLAST also computes glass breakage probability, models glass fragmentation and motion, models the occurrence of casualties (taking into consideration the building occupancy), and also takes into account vehicle failure mode probability, etc. The risk approach has reduced the probability of launch holds enormously at both ranges so that blast considerations are of less importance than debris and toxics.

The new BLASTX program also treats the yield probabilistically (over a range) and there is less necessity to be conservative with the assumed yield. ACTA believes that the blast hazard evaluation of the Hawaiian Spaceport was based on the very best data and models available, however, it was also advised that a risk analysis would be more realistic and show that the impacts are much less threatening than they appear in a hazard analysis.

Comment: *The carbon monoxide (CO) emissions estimated for Atlas IIAS, Delta II, and Taurus launches on page 5-85 of Volume I add to over 100 tons, not 80 tons as indicated on page 5-86.*

Response: We apologize for the inadvertent error. A correction of 100.8 tons has been made to page 5-86.

Comment: *Calculated HCl concentrations are given as 30-minute average values. These need to be converted to the equivalent 60-minute average values to allow a direct comparison with the SPEGL values.*

Response: The short-term 1-hour acceptable exposure level (AEL) for hydrogen chloride determined in the health risk assessment is 3 ppm (5,000.$\mu g/m^3$). This value is equivalent to the 1-hour maximum likelihood exposure level (MLE) listed by the EPA (1991) which is the maximum concentration of HCl reported to be tolerable to humans for one hour. This value is used in the health risk assessment because it has a more reliable toxicological basis than the 1-hour SPEGL (1 ppm or 1,500.$\mu g/m^3$) proposed by NRC (1985b). A 30-minute AEL would be greater than a 1-hour AEL.

The air dispersion modeling conducted to estimate ground level concentrations of pollutants emitted during normal launch and conflagration episodes in the health risk assessment resulted in 30-minute time mean concentrations for hydrogen chloride at the 66 receptors evaluated. All 30-minute time mean concentrations are less than the 1-hour AEL for HCl. If a 30-minute AEL were to be determined, it would be greater than the 1-hour AEL, thus resulting in calculation of lower hazard indices. Furthermore, if 60-minute time mean concentrations were to be modeled, they all would be less than the 30-minute time mean concentrations. Therefore, while calculation of a 30-minute AEL or remodeling to determine 60-minute time mean concentrations can be done, all these exposures would result in lower impacts than those disclosed in the health risk assessment (Appendix VIIIA).

In summary, 60-minute time mean concentrations for HCl would be less than the 30-minute time mean concentrations determined for normal launch, on-pad conflagration, and ascent conflagration 10 seconds after lift-off (0.23 ppm, 0.11 ppm, and 2.5 ppm respectively) which are all less than the 1-hour AEL.

Comment: *The Strategic Target Systems (STARS) DEIS for launches on Kauai cites the Hawaii HCl guideline which is an 8-hour average value of 0.0025 ppm. The final EIS should discuss the Hawaii HCl guideline and the methodology to be used for converting 30-minute average values to 8-hour average values.*

Response: As noted in the STARS DEIS, the Hawaii HCl Guideline is based on an occupational workplace guideline for continuous emissions of hydrogen chloride. Comparison of this 8-hour average value to 30-minute values related to a single event would be meaningless. In 1990, the Department of Health advised the preparers of the STARS EIS that because each launch is a limited-term event, the impacts should be determined for a shorter averaging period. A 1-hour average concentration is preferable to the 8-hour average concentration as reported (STARS Final EIS, Volume I, May 1992, p. 4-25). The STARS EIS does in fact use a more stringent shorter time period in its evaluation of impacts.

Comment: *Some empirical data should be cited to support the assertion that nearly all carbon monoxide emitted by the rockets will oxidize to carbon dioxide.*

Response: The afterburning process that oxidizes carbon monoxide to carbon dioxide has been documented in prior studies. Most of the research performed was related to launches of the Space Shuttle and Titan-III rockets using solid rocket motors (SRMs). While the SRMs are larger, the principle is the same in the afterburning process. Actual airborne measurements were made through the Titan-III ground cloud to confirm the low carbon monoxide values. More details on the prior research can be found in the following references:

Gomberg, R. and Wilmoth, R. 1977. Afterburning Processes Occurring Within the Solid Rocket Motor Plumes of the Space Shuttle Near the Launch Pad.

Gomberg, R. I. and Stewart, R. B. 1976. A Computer Simulation of the Afterburning Processes Occurring Within Solid Rocket Motor Plumes in the Troposphere. NASA TN-D-8303.

Comment: *REEDM version 7.03 used for the STARS EIS gave HCl and CO concentrations as close as 1000 m from the launch pad. Why are there no values closer than 3000 m in the draft EIS?*

Response: The primary concern of the dEIS was to determine potential impacts to off-site populations. It was assumed that no person would be involuntarily subjected to impacts inside of 3000 m of the launch pads (the Population Control Zone [PCZ]). Also, the vehicles, attendant structures and distances to populated areas for the conceptual plan are much larger than those assessed in the STARS EIS.

Comment: *It is surprising that the HCl and aluminum oxide concentrations within 20 km of the launch pad that are predicted for a conflagration are smaller than those predicted for a normal launch. One would expect that a conflagration would produce a greater quantity of these combustion products below an altitude of 5000 feet than a normal launch. If so, then it seems that the greater heat in the conflagration must produce a more buoyant cloud of combustion products. The amount of buoyancy of this cloud apparently depends upon assumptions about the details of the conflagration. For example, the REEDM calculations done for STARS EIS predict much greater HCl concentrations (within 10 km of the launch pad) for a conflagration than for a normal launch. To better evaluate the reliability of the REEDM predictions, it would be helpful to do the following:*

a) make a detailed comparison of the quantities of combustion products produced below 5000 feet for a normal launch and for a conflagration

b) compare the predicted concentrations of HCl for a wind speed of 1 m/sec as used in the STARS EIS

c) compare quantitatively the REEDM predictions with data from previous launches.

Response: Detailed assumptions used in the REEDM analyses are contained in Appendix VIID. As stated on page 4-24 of the appendix:

> *"Since the conflagration mode models the burning of solid propellants, the combustion by-products of concern are hydrogen chloride gas and aluminum oxide particulates as was the case for a normal launch. In the case of a vehicle explosion, however, solid rocket boosters (SRBs) are assumed to be ruptured and solid propellant scattered as burning fragments. The following analyses were based on the Delta II 7925, wherein varying numbers of the 9 SRBs are assumed to be destroyed.*
>
> *In order to predict the downwind concentration of gases it is necessary to assign a total amount of solid fuel and a burn rate to characterize the burning solid fuel fragments consumed in a conflagration. Destruct debris lists published by McDonnell Douglas for the Delta II 7925 were used to characterize the number, size, and weight of solid propellant fuel fragments produced by a destruct action of the Graphite Epoxy Motors (GEMs) and the Stage 3 solid rocket motor. A burn rate of 3.9 mm/sec was used to compute the solid propellant burn rate at one atmosphere of pressure. The burn rate and fragment characteristics were used to compute an average fuel mass burn rate for each conflagration case modeled."*

An explosion on the pad involving all nine SRBs on the Delta vehicle under the Hypothetical Worst Case weather condition resulted in the maximum peak HCl 30 minute time mean concentration predicted to be 0.11 ppm at a location 48 kilometers downwind from the pad. You are correct in assuming that more combustion products are present below 5000 feet and that the conflagration produces a more buoyant cloud than a normal launch. This is why the maximum HCl 30 minute time mean concentration of 0.184 occurs at 15 kilometers for a normal launch--much closer to the launch pad than the conflagration scenario. The buoyancy of the cloud enables it to travel a greater distance and more diffusion takes place while aloft than for the normal launch scenario, which is the reason that HCl and aluminum oxide concentrations within 20 km of the launch pad predicted for a conflagration are smaller than those predicted for a normal launch.

The vehicles evaluated for the dEIS are much larger than those analyzed in the STARS EIS. For example, the Taurus vehicle carries 141,423 lbs. of solid propellant, while the Delta II carries 236,694 lbs. of solid propellant and 27,429 gallons of liquid propellant. It is simply not within the scope of the dEIS to compare results from the STARS EIS to those in the dEIS, nor would it serve any utility given the considerable differences between mission profiles, site characteristics, and vehicle sizes.

The REEDM program, which was used to compute predicted exhaust concentrations, has its origins in NASA's Multilayer Diffusion Model, which was developed in the 1970s to model the dispersion of effluent from the large boosters used for NASA's space programs. The model has evolved since its inception, due in part to the quantitative comparison between computed predictions and field measurements. Version 7.04 of the REEDM code was used for the dEIS analyses.

Comment: *Even if all the debris from an explosion shortly after lift-off is contained within the population control zone (PCZ), it is possible that brush fires started by burning debris could spread to the propellant storage area within the PCZ or outside the PCZ. For example, the 15 June 1993 Minuteman I failure at Vandenberg Air Force Base started brush fires that burned 400 acres on and 600 acres off the base. The final EIS should examine the potential for brush fires from a similar failure at Palima Point.*

Response: This is a valid concern. Brush fires are certainly an acknowledged risk at Vandenberg Air Force Base. As far as the Palima spaceport is concerned, any hazardous material stored on the facility must be protected in such a way that fire will not lead to burning or explosion of propellants and the introduction of toxic materials into the environment. Mitigations of this hazard include: (1) clearing of all brush some distance away from any storage area; (2) making storage areas resistant to any local fires started by propellant impacts; and (3) inclusion of adequate fire suppression equipment and procedures.

Comment: *The impacts, both localized and global, of the ozone depletion that will result from the HCl emitted directly into the stratosphere by solid-fuel rocket motors needs more discussion than the single paragraph on page 5-161 of Volume I. In evaluating the significance of the ozone depletion, one should consider the global effort to phase out use of ozone-depleting substances and Hawaii laws which try to reduce ozone depletion by banning deliberate release of some ozone-depleting substances.*

Response: A more detailed discussion on the impacts of ozone depletion is provided in Appendix XD. The discussed impacts look at the contribution of HCl emissions below the stratosphere as well as directly injected HCl as the rocket passes through the stratosphere. The relationship of the launches to the global effort to phase out the use of ozone-depleting substances is addressed on page 9 of that Appendix. Note that on the global scale the dEIS indicates that ozone depletion would not be eliminated if the launch facility is not constructed in Hawaii. The launches will still take place somewhere else.

On the local scale there still remains some controversy of whether a local "hole" in the ozone layer is formed immediately following the launch of a rocket. NASA has indicated that rocket launches can have a significant effect on the stratosphere by reducing the ozone substantially (perhaps >80 percent) within the expanding exhaust plume up to 3 hours after launch (World Meteorological Organization, 1991). Since the rocket trajectory is slanted, the corresponding column ozone loss is computed to be reduced over an area of a few hundred square kilometers, but the depletion nowhere exceeds 10 percent. These conclusions have been supported by measurements made by the Total Ozone Mapping Spectrometer (TOMS) on Nimbus 7 satellite.

Some questions have been raised regarding the validity of the small percentage depletion reported by NASA in the ozone column due to the direct injection of exhaust products in the stratosphere. The resolution of the TOMS data may be too coarse to observe an actual depression or "soft spot" in the ozone column. In addition, even though the launch vehicle trajectory is slanted, the distribution of ozone in the

stratosphere is not linear and a high percentage destruction of an ozone rich thin layer could produce a "local hole" in the vertical column. Due to the lack of resolution of the existing measurement systems to measure ozone in the launch corridor, the U.S. Air Force has initiated development of the High Resolution Ozone Imager. It will monitor the launch corridor within one to three hours after the launch, during which the concentration of ozone is predicted to reach its lowest level. If and when this system is implemented a better understanding of the local effects of ozone depletion will be obtained.

References:

J.R. Bjorkland. April, 1990. User's Manual for the Version 7 (Rocket Exhaust Effluent Diffusion Model) Computer Program, Vol. I. H.E. Cramer Company, Inc..

Kingery, C. N. and B. F. Pannill. 1964. "Peak Overpressures vs. Scaled Distance for TNT Surface Bursts (Hemispherical Charges)." Memorandum Report No. 1518, Ballistic Research Laboratories, Aberdeen Proving Ground, Maryland.

National Research Council (NRC). 1985b. Emergency and Continuous Exposure Guidance Levels for Selected Airborne Contaminants, Volume 5. Prepared for the Department of the Army, Washington, D.C.

Overbeck, K. December 1983. "Analysis of Issues Related to ESMC Blast Propagation Modeling." J. H. Wiggins Company Document No. 1451-2.

Pape, B.J., Minor, J.E., and DeHart, R.C. 1966. "Evaluation of Window Pane Damage Intensity in San Antonio Resulting from Medina Facility Explosion on 13 November 1963." Southwest Research Institute Project 03-1716 prepared for Sandia Corporation, Albuquerque, New Mexico, 43 p.

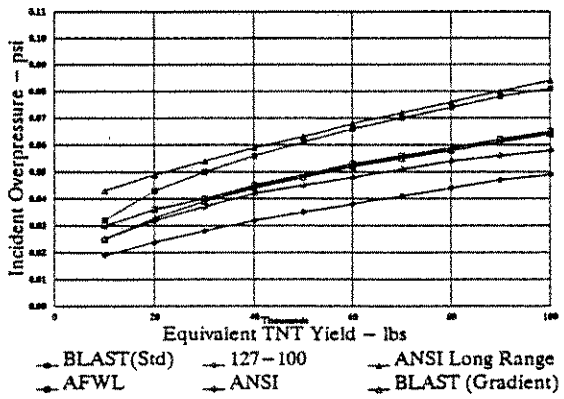
World Meteorological Organization, Scientific Assessment of Ozone Depletion: 1991. World Meteorological Organization Global Ozone Research and Monitoring Projects -- Report number 25. National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, United Kingdom Department of the Environment, United Nations Environment Program, World Meteorological Organization.

attachment

COMPARISON OF OVERPRESSURE ATTENUATION MODELS
(FUNCTION OF YIELD)

Range R			Yield W	Scaled Range	Overpressure (Delta P) from Various Models (1)					
					BLAST Stand.	BLAST Grad.(2)	127-100	AFWL	ANSI	ANSI Long R(3)
(m)	(ft)	(miles)	(lbs)	(R/W^.33)	(psi)	(psi)	(psi)	(psi)	(psi)	(psi)
5700	18588	3.52	10000	865	0.032	0.025	0.019	0.030	0.025	0.043
5700	18588	3.52	20000	687	0.043	0.033	0.024	0.036	0.032	0.049
5700	18588	3.52	30000	600	0.050	0.039	0.028	0.040	0.037	0.054
5700	18588	3.52	40000	545	0.056	0.044	0.032	0.045	0.042	0.059
5700	18588	3.52	50000	506	0.061	0.048	0.035	0.049	0.045	0.063
5700	18588	3.52	60000	477	0.066	0.052	0.038	0.053	0.048	0.068
5700	18588	3.52	70000	453	0.070	0.055	0.041	0.056	0.051	0.072
5700	18588	3.52	80000	433	0.074	0.058	0.044	0.059	0.054	0.076
5700	18588	3.52	90000	416	0.078	0.061	0.047	0.062	0.056	0.080
5700	18588	3.52	100000	402	0.081	0.064	0.049	0.065	0.058	0.084

Notes: (1) Surface burst.
(2) For wind delta V in the model equal to zero.
(3) Developed for large yields and long ranges (>100 KM)



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To Dick Flagg | From
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November 18, 1993

The Honorable John Waihee
Governor, State of Hawaii
State Capitol
Honolulu, Hawaii 96813

Dear Governor:

It is my considered judgment that the proposed project to build a "spaceport", or Rocket Launching Facility at Palima Point, Hawaii, is ill advised and should not be allowed to go any further. After closely examining the draft of the Environmental Impact Statement, and giving serious consideration to all of the economic and social impacts of the proposed project I can find no justification for continuing to invest the tax payers money, or the government's limited time and resources in this project.

I have gone to great efforts to give this proposal fair consideration. I have had long conversations with state officials on the projected costs and benefits. I have listened carefully to the various individuals and participating agencies during the Special Subcommittee of the Planning Committee of Hawaii County. All my investigation either leads to unanswered and yet critical questions, or to very disturbing answers to those questions which have been answered.

The proposed economic benefits turn out to be benefits to a handful of special interests, and do not address the real economic problems of our island. The jobs which would be created will not go to those who currently need employment on the island. These proposed jobs will instead go to those whom the corporation or state brings in to fill the requirements of very specialized labor. Even if we set aside the propaganda about job creation for islanders, the economic reality is that this project does not fit with existing economic enterprises on the island, or other proposed economic ventures for economic development.

The Honorable John Waihee
November 18, 1993
Page 2

Hawaii is the unique and beautiful place it is, in great part because of the nature of our economy. Our economy is based on a unique combination of modern technology and agricultural enterprises. The fishing and dairy industries contribute to the overall health and well being of our island. The University and the scientific community also contribute to our well being and work well with the rest of our economic base. There are many unanswered questions about the effects of the "spaceport" on our already established scientific enterprises. Specifically there are very real concerns within the scientific community about the effects of the required radar tracking stations on submillimeter band telecope observations, as well as the detrimental effects of particulate dispersion produced by rockets above 100,000 feet altitude. It does not make sense to risk the $50,000,000 per year contribution to our community provided by the astronomical industry in favor of a proposed project which shows ever indication of becoming a financial burden, as well as social, cultural, and ecological disaster for Hawaii. Hawaii could be better served by a careful expansion and diversification of its current economic base.

Tourism is an industry that, with careful management, can like our current scientific, and agricultural enterprises contribute a great deal to the ecological, cultural, and economic well being of our island. If we recognize that people come to Hawaii, and contribute to our economy, because of our unique ecological and cultural heritage we can plan for a truly viable economic future while addressing the current pressing needs of our citizens. The economic reproduction of our cultural heritage, the preservation of our National Park, which is recognized as a World Heritage Site and the Biosphere Reserve, and the careful diversification of our economy will make it possible for Hawaii to integrate itself into the world economy in a forward looking manner, rather than simply reacting to immediate problems with inappropriate economic ventures.

While a Rocket Launching Facility, which would truly serve the needs of scientific exploration, and commercial development, of space may be a good idea in the abstract, the truth is neither the scientific or corporation world has supported building such a facility at this time, on this island. After almost a decade of effort on the part of the State of Hawaii not one corporation has shown more than cursory interest in this project. There is not a single corporation in the world that can even conceive of a way to make this a potentially profitable enterprise for themselves, let alone a corporation that has been able to suggest a way in which its own economic interest might overlap with those of Hawaii. The project is simply not economically viable on any level at this site. At another place, at some further date, this project may prove to be both viable and beneficial, but it is not, and never will be a good idea for Hawaii.

The Honorable John Waihee
November 18, 1993
Page 3

There are few places in the world where the risks of this project would be as great as they are here on our island. The EIS not only mentions the dangers of lava flows and earth quakes for environmental catastrophes, but also the unavoidable day to day environmental costs of operating this facility. This report mentions the problems, but says little about how to deal with what it classifies as "extremely hazardous materials". Even if we could manage the day to day costs of operating this facility, the county would be unable to meet its obligations for partial liability in the event of an environmental catastrophe.

Even if I could find some way, in good conscience, to ignore all of these very real and objective problems and risks with the proposed "spaceport", as an elected official I could not ignore the overwhelming opposition of the residents of my district and the rest of the island. In fact, even if this had been a good proposal in the first place, the arrogant way in which it has been put forward by the state has produced an emotional reaction here on the island that makes it a dead issue on those grounds alone.

It is for all these reasons that I continue to make public my opposition to this project. All support and funding for this project should be terminated immediately, and now that the problems inherent in this entire venture are recognized by all, should become lessons for future planning.

Sincerely,

Keiko Bonk-Abramson
Councilmember, District of Kau

cc: Mufi Hanneman, Director, DBEDT
Mohashi Yoshihara, Director, Office of Space Industry
Engineer, Office of Space Industry

12-116

KEIKO BONK-ABRAMSON
Councilwoman

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Hilo, Haw

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To: Dick Mayer | From:
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NOTE: THIS DOCUMENT IS A PART OF INFORMATION PROVIDED ...

KEIKO BONK-ABRAMSON
Councilwoman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

TO: Director/ DBEDT
PLEASE COORDINATE with
FOR:
___ Comment/Recommendation (required)
___ Appropriate attention
___ Direct reply (cc/bcc: Governor)
___ Your information/file
V Draft reply for Governor's signature
___ Follow up/report
___ Submit copy of response (if any)
___ Keep enclosure(s)
V Return enclosure(s)
Other
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DUE seven working days from NOV 19 93
If delay is encountered in meeting suspense date, please advise by telephone (immediately).
In reply, please refer to: 93-303945

November 18, 1993

The Honorable John Waihee
Governor, State of Hawaii
State Capitol
Honolulu, Hawaii 96813

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It is my considered judgment that the proposed project to build a "spaceport", or Rocket Launching Facility at Palima Point, Hawaii, is ill advised and should not be allowed to go any further. After closely examining the draft of the Environmental Impact Statement, and giving serious consideration to all of the economic and social impacts of the proposed project I can find no justification for continuing to invest the tax payers money, or the government's limited time and resources in this project.

I have gone to great efforts to give this proposal fair consideration. I have had long conversations with state officials on the projected costs and benefits. I have listened carefully to the various individuals and participating agencies during the Special Subcommittee of the Planning Committee of Hawaii County. All my investigation either leads to unanswered and yet critical questions, or to very disturbing answers to those questions which have been answered.

The proposed economic benefits turn out to be benefits to a handful of special interests, and do not address the real economic problems of our island. The jobs which would be created will not go to those who currently need employment on the island. These proposed jobs will instead go to those whom the corporation or state brings in to fill the requirements of very specialized labor. Even if we set aside the propaganda about job creation for islanders, the economic reality is that this project does not fit with existing economic enterprises on the island, or other proposed economic ventures for economic development.

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TY 12 NOV
V Draft reply for Governor's signature
___ Draft reply for Director's signature
___ Draft reply (to/bcc: Director)
___ Comment/Recommendations
___ File
___ Concur

Hawaii is the unique and beautiful place it is, in great part because of the nature of our economy. Our economy is based on a unique combination of modern technology and agricultural enterprises. The fishing and dairy industries contribute to the overall health and well being of our island. The University and the scientific community also contribute to our well being and work well with the rest of our economic base. There are many unanswered questions about the effects of the "spaceport" on our already established scientific enterprises. Specifically there are very real concerns within the scientific community about the effects of the required radar tracking stations on submillimeter band telecope observations, as well as the detrimental effects of particulate dispersion produced by rockets above 100,000 feet altitude. It does not make sense to risk the $50,000,000 per year contribution to our community provided by the astronomical industry in favor of a proposed project which shows ever indication of becoming a financial burden, as well as social, cultural, and ecological disaster for Hawaii. Hawaii could be better served by a careful expansion and diversification of its current economic base.

Tourism is an industry that, with careful management, can like our current scientific, and agricultural enterprises contribute a great deal to the ecological, cultural, and economic well being of our island. If we recognize that people come to Hawaii, and contribute to our economy, because of our unique ecological and cultural heritage we can plan for a truly viable economic future while addressing the current pressing needs of our citizens. The economic reproduction of our cultural heritage, the preservation of our National Park, which is recognized as a World Heritage Site and the Biosphere Reserve, and the careful diversification of our economy will make it possible for Hawaii to integrate itself into the world economy in a forward looking manner, rather than simply reacting to immediate problems with inappropriate economic ventures.

While a Rocket Launching Facility, which would truly serve the needs of scientific exploration, and commercial development, of space may be a good idea in the abstract, the truth is neither the scientific or corporation world has supported building such a facility at this time, on this island. After almost a decade of effort on the part of the State of Hawaii not one corporation has shown more than cursory interest in this project. There is not a single corporation in the world that can even conceive of a way to make this a potentially profitable enterprise for themselves, let alone a corporation that has been able to suggest a way in which its own economic interest might overlap with those of Hawaii. The project is simply not economically viable on any level at this site. At another place, at some further date, this project may prove to be both viable and beneficial, but it is not, and never will be a good idea for Hawaii.

There are few places in the world where the risks of this project would be as great as they are here on our island. The EIS not only mentions the dangers of lava flows and earth quakes for environmental catastrophes, but also the unavoidable day to day environmental costs of operating this facility. This report mentions the problems, but says little about how to deal with what it classifies as "extremely hazardous materials". Even if we could manage the day to day costs of operating this facility, the county would be unable to meet its obligations for partial liability in the event of an environmental catastrophe.

Even if I could find some way, in good conscience, to ignore all of these very real and objective problems and risks with the proposed "spaceport", as an elected official I could not ignore the overwhelming opposition of the residents of my district and the rest of the island. In fact, even if this had been a good proposal in the first place, the arrogant way in which it has been put forward by the state has produced an emotional reaction here on the island that makes it a dead issue on those grounds alone.

It is for all these reasons that I continue to make public my opposition to this project. All support and funding for this project should be terminated immediately, and now that the problems inherent in this entire venture are recognized by all, should become lessons for future planning.

Sincerely,

Keiko Bonk-Abramson
Councilmember, District of Kau

cc: Mufi Hanneman, Director, DBEDT
Takeshi Yoshihara, Director, Office of Space Industry
Richard S. Flagg, Principal Engineer, Office of Space Industry
The Honorable Stephen Yamashiro, Mayor, County of Hawaii
The Honorable Andrew Levin, State Senator, District 3
The Honorable Robert Herkes, House Representative, District 4
The Honorable Patsy Mink, U.S. Representative, District 2
The Honorable Neil Abercrombie, U.S. Representative, District
The Honorable Daniel K. Inouye, U.S. Senator
The Honorable Daniel K. Akaka, U.S. Senator
The Honorable Malama Solomon, State Senator, District 1
The Honorable Richard Mastuura, State Senator, District 2
The Honorable Jerry Chang, House Representative, District 2
The Honorable Harvey Tajiri, House Representative, District 3
The Honorable Dwight Takamine, House Representative, District 1
The Honorable Virginia Isbell, House Representative, District 5
The Honorable Larry Tanimoto, House Representative, District 6

KBA/ctd

COPY

Albert E. Smith, Vice President
Advanced Government and Commercial Systems
Lockheed Missiles and Space Company, Inc.
Sunnyvale, California 94089-3504

July 6, 1993

Dear Mr. Smith,

The more than one thousand petitioners whose signatures are enclosed ask that Lockheed reconsider involvement in the proposed rocket launch facility in Kau. We are particularly concerned because in as recent a letter as one dated June 4, 1993, Mufi Hanneman has continued to assure Senators Levin, Matsuura, and Solomon, along with the students of Kau High School, "that the state and Lockheed Corporation have agreed to build a commercial satellite launching facility on the Big Island."

Since your letters of agreement cite Defense Conversion Funds as potential financial support, it is our response to point out that no federal funding may be spent prior to the acceptance of a Final FEDERAL EIS. According to the latest "Conceptual Plan", the "environmental analysis currently being conducted is intended to meet the requirements of Hawaii Revised Statutes Chapter 343 and the state Department of Health's EIS rules...It will also form the basis for a document that will meet the requirements of the federal National Environmental Policy Act."

It seems that the Office of Space Industry only intends to release a State EIS that will not be sufficient to satisfy NEPA requirements, so you, at Lockheed, may have to wait as long as we have to see a FEDERAL EIS document.

In the mean time, the petitioners are requesting that their Congressional Representatives be aware of this potential for abuse of defense conversion funds on the part of Lockheed.

As well, more visible publicity is being arranged through various environmental groups for the delivery in the not too distant future to you, personally, the remainder of the petitions which already contain over 5000 signatures (with the numbers increasing daily).

It is strongly urged that Lockheed Missiles and Space Company, Inc. immediately sever ties to this questionable project lest Lockheed be further tainted by OSI scandal (see, e.g., Hayward conflict of interest detailed as the lead story in Environment Hawaii, July 1993, enclosed).

Sincerely,

Sandra Demoruelle

Sandra Demoruelle, Project Coordinator
Informational Network for the Spaceport
P.O. Box 588, Naalehu, Hawaii 96772-0588

bcc: Isbell
Bonk ✓

The Honorable Richard Matsuura
State Office Tower
Honolulu Hawaii 96813

July 6, 1993

Dear Senator Matsuura,

The more than one thousand petitioners whose signatures appear on the enclosed documents respectfully request that the Senate committee inquiry into Hawaii State procurement practices add to its investigation the numerous contracts Office of Space Industry has awarded since its inception in 1988 without regard for HRS 103-22,26. Of particular concern is the re-awarding of the EIS contract to Marilynn C. Metz, a sole proprietorship dba MCM Planning.

The DAG (correspondence of January 2, 1992, enclosed) indicates that the original EIS contract with CH2M Hill was NOT awarded competitively. However even a cursory examination of the records, including the advertising that was done nationally (published May 1988, enclosed), the more than 50 responses, and the wording of the RFPs sent to the six finalists (June 24, 1988, enclosed, p. 14), indicate a HRS 103-22 "bid" process DID occur with CH2M Hill ending up the successful bidder.

Further, the DAG goes on to claim that the EIS contract is "exempt from chapter 103, HRS." This conclusion is drawn because: "The purpose of a competitive bid requirement of chapter 103, HRS, is to obtain goods or services at the lowest cost."

An inspection of chapter 103-22, HRS, reveals a different legislative intent than that given by the DAG: "The object of advertising for tenders is to secure fair competition and prevent favoritism and extravagance. 21 H. 87; 29 H. 48."

Thus the petitioners wish to point out that the sole-source EIS contract awarded to Marilynn Metz was in contravention to the intent of HRS 103. There is a strong appearance of abuse and favoritism in the non-competitive awarding of this EIS contract when so many qualified organizations responded to the initial advertisement, especially given the historic background of numerous prior non-bid contracts between DBEDT/OSI and Marilynn.

In light of the tremendous interest by highly qualified technical organizations competing for this EIS contract when first advertised for bids, what can justify re-awarding the EIS contract to Marilynn C. Metz on April 1, 1991 WITHOUT bids?

This very question was asked of Karen Blondin, Office of the Ombudsman, on July 17, 1991. Two years later, Alfred Itamura (per Office of the Ombudsman reference #92-454 to 457) has remained unable to provide an answer.

Having exhausted state administrative remedies through the DAG, DAGS, and the Office of the Ombudsman, we are left with this investigative committee as a last resort before initiating legal action or requesting a federal investigation.

In conclusion, the petitioners trust that the praise given to you in the Hawaii Tribune Herald editorial titled "Matsuura earning points with public" (June 27, 1993,p.10) is well earned. A rapid conclusion to the controversial "spaceport" project may save the administration the embarrassment of more scandal being revealed (see, e.g., Environment Hawaii, July 1993, enclosed), but if need be, we are determined to continue fighting.

We only hope that you will act swiftly to assist us.

Please contact me at your earliest convenience to arrange further discussion of this matter at a meeting between us that can be located in either Hilo or Naalehu.

Sincerely,

Sandra L. Demoruelle
Project Coordinator
Informational Network for the Spaceport
P.O. Box 588, Naalehu Hawaii 96772
Telephone (808) 929-9244

bcc: Bonk-Abramson ✓

The Honorable James Aki
State Office Tower
235 South Beretania Street
Honolulu, Hawaii 96813

July 8, 1993

Dear Senator Aki,

Enclosed is INFS' request to the Ethics Commission to investigate Space Czar Hayward's potential conflicts of interest involving the "spaceport" project.

But an Ethics investigation may only reveal the tip of the iceberg. Isn't it time that the Legislature took a good look at where ALL the taxpayers money has been spent by OSI with only a "paper" agreement with Lockheed to show for it?

We hope you will support us by requesting a Legislative Audit of OSI expenditures since it seems that enough improprieties have arisen that the whole of OSI expenditures should be examined (see, e.g., Environment Hawaii, July 1993, enclosed).

We hope that you will be able to help us in procuring an accountability on the part of OSI bureaucrats for millions of wasted tax-dollars.

Thank you for your assistance.

Sincerely,

Sandra Demoruelle, Project Coordinator
Informational Network for the Spaceport
P.O. Box 588, Naalehu HI 96772
(808) 929-9244

bcc: Bnk ✓

JON LOMBERG
124A Painted Church Road
P.O. Box 207
Honomanu, Hawaii 96726
Tel. 808-328-9598 Fax. 808-328-9692

May 31, 1993

Dear Keiko,

A few comments on the article that appeared today in West Hawaii Today giving the opinions of state legislators on the spaceport:

People still all seem to be accepting the premise that this will be a big business. I belive it will be like a hotel with a 20% occupancy rate. WHY IS THE STATE PAYING TO BUILD THIS? The State doesn:t invest in hotels, even though they are a proven business.

— Sen. Matsuura says that telecommunications may be a trillion dollar industry. (Perhaps, although developing ground-based opitcal fiber technology, with greater and more efficent capacity than electronic cable, will become increasingly competitive with communication satellites. But assume that comm sats remain important.)

Comm sats require GEOSYNCHRONOUS ORBITS not POLAR ORBITS. The big "advantage" of Hawaii, they say, is that we can launch into polar orbit. Polar orbits are useless for most comm sat, resource monitoring, and other pruposes. I'll explain the difference between polar and equatorial orbits to you sometime if you like, but the main point is that the vast majority of satellites do not require (indeed, would be useless) with polar orbits. Certainly the comm sat industry doesn't use them.

— I am sure OSI and supporters will wave around lots of figures that seem to imply that launch facilities are gold mines. But if so, WHY HAVEN'T THE DEVELOPERS BEEN LINING UP TO INVEST? AND WHY DOES THE STATE HAVE TO PUT UP MONEY? Why has a similar development had such an uphill struggle in Australia? Why haven't the Japanese been banging down our doors for permission to invest? Whatever figures OSI throws up as a smokescreen, I suggest that you keep bringing the argument back to that: why hasn't the money shown up in the last 7 years they've been pushing this thing? I'm sure Lockheed is willing to make it sound wonderful, as long as they don:t have to put in the bulk of the money. PIN THEM DOWN ON THIS. HOW MUCH IS LOCKHEED INVESTING? ALL? HALF? ONE-THIRD? WHO PAYS THE REST?

— Think about how much electrical power a launch facility requires. Where does that come from? And the millions of gallons of water to cool down the pads, gantrims, etc. From where? Roads to transport truckloads of highly combustible and voaltile fuels? Forget the safety questions, who builds (and pays for) the roads? These "hidden costs" of developing infrastructure may be a big reason there has been no investment so far.

Hope this info is useful.

Best,

Jon

EDWARD M. MICHEL - P.O. BOX 881 - NAALEHU, HI 96772 - (808) 929-8036

June 11, 1993

Mr. Albert E. Smith
Vice President
Advanced Government and Commercial Systems
Lockheed Missles and Space Co., Inc.
Sunnyvale, CA 94089-3504

Dear Mr. Smith,

I am writing with reference to the proposed rocket-launching facility that Lockheed Missles and Space is considering constructing here in Kau, quite possibly, if the State's representations are correct, quite close to my home in Green Sands subdivision, between Naalehu and Waiohinu, about six and a ha miles above Kaalualu Bay, or the Kahilipali Point Site, as the State refers t it in its planning.

I'm quite curious about the site selection, and want to make sure that Lockheed has an accurate picture of the infrastructure considerations here at the south end of Big Island. I know that your contacts have largely been wit the representatives of the State Government in Honolulu, who appear to be anxious to have some outside money come into the State and particularly into an undeveloped part of Big Island, despite the considerable opposition of mos of the inhabitants of Kau.

First of all have you been made aware of the fact that there is insufficient water to serve the small community that exists here. We are regularly informed by the County of Hawaii that our part of the Island is under drought conditions, and that unnecessary water usage is to be strictly limited. Sinc I live a mile and a half from the highway, it was necessary for me to run my own water lines that distance, after the Water Department had provided me wit a connection to county water from the intersection of Highway 19 and Kaalualu Road, which runs into our subdivision, and, incidentally, is the onl road running down to Kaalualu Bay. I know you're going to need water--and lots of it--to operate. I can't tell you where you're going to get it arounc here, though.

Since I've mentioned the only road down to the suggested site, I ought to point out that it's only a single-lane road, and at that is only paved down t the first street in our subdivision. From there it's another five or six miles down rather badly rutted dirt and rock road to the Bay. Of course you can make it in a pickup without four-wheel drive, if you're high enough off the roadbed, but I suspect it's not the kind of road you'd want to bring rocket fuel in on. At the moment, it takes less than an hour to drive from my house down to the bay, which is about five miles by road. The County more or less manages to maintain the Highway, but shows no signs of doing anythinc about the road leading down here.

In fact, you might want to take a good look at the road from Hilo to Naalehu, since everything with which you're going to be building is going to have to come from there. My experience, which comes from having built a house here, is that there are certain real problems with transportation, shipping, and delivery in a place this isolated. I imagine that you plan for this sort of thing when you're going to build a multi-million dollar launching site, but there is the real consideration that there's nothing here--it's all going to have to come from sixty-five miles away, the nearest convenient port site; ar in fact, very little of the structural material you're going to need comes

from this Island. Now that's not am impossible situation, since most of the people who've built resorts here have had to deal with similar problems; but they've all run into substantial--one might say horrendous--cost overruns as a result.

And, from the Kailua-Kona airport, where most of the Mainland flights will arrive, it's about an hour and three-quarters drive down to Naalehu. From the Hilo airport you can shave perhaps twenty minutes off that. It's kind of a haul after you've gotten off a five-and-a-half hour flight, but after you've driven it a few times you get to know the curves pretty well, and it's not really all that risky unless it's raining.

At the moment, insurance is unobtainable for new construction. I assume that Lockheed has sufficient connections to do something about that, though. Maybe it'll be able to help a lot of local homeowners who have been in trouble since Hurricane Iniki just seemed to have taken the wind out of all the local insurance coverers' sails.

And you're going to need a substantial power source. I wouldn't count on our ability to deliver electricity in significant and reliable quantities. Our Island electric company, HelCo, Hawaiian Electric, has a pretty bad track record dealing with the demand that exists right now, and has been announcing that they're going to need a new hundred-million-dollar generator just to keep up with what the Island requirements are right now. Blackouts and brownouts are endemic. When I built the house I decided to put in my own solar system, because, expensive as it was, it was a whole lot cheaper than what HelCo wanted to charge me to run their poles less than half a mile to my house.

Since you're in the space business, I assume you already know a lot more about communications than I do. That'll be helpful, because we have the oldest working telephone switching system in the United States here in Kau. Hawaiian Tel assures us that they're definitely working on it, though, and I'm sure that you and they will be able to come up with something. I would assume that your people will be spending a good deal of time on the long-distance phone to the Mainland, and probably won't want an operator cutting in every now and then to confirm the number you're calling from and the like. You get used to it after awhile. Computer modem connections tend to be pretty much OK, once you find a line to connect on. What's the rush, anyway? I haven't noticed any phone lines going down to the point, but I'm sure something can be arranged.

Not a whole lot of available housing hereabouts. Lots of empty lots here in Green Sands, in the nearby subdivisions of Mark Twain and Discovery Harbour, and in Hawaiian Ocean View Estates, which is about half an hour's drive away, assuming a good road is put in. A few of them have water, phone and power, or at least have been promised access to the lines. There are a couple of great places when you want to eat down here--Lily's, Tabbada's, and Santangelo's Pizza at the Naalehu Fruit Stand come to mind--but none of them, at the moment, seem to be ready to handle a lot of Rocket Scientist business. And there isn't exactly an excess of sophisticated nighttime entertainment. We get one AM station, sort of a nostalgia 30's-to-50's pop melange, one FM station, a similar wimp-rock outlet, and, when the weather's right, we can pull in the educational TV channel out of Honolulu. But there's always time to read, and the Naalehu library is open from 1 to 5 every Tuesday and Thursday. And you can rent videos, in case somebody's driving into Hilo or Kona to pick up and return 'em.

As I mentioned, there isn't much local support for a Rocket Launch Facility--most of us feel there are things that would do the people of Kau a lot more good and probably cost less. The State Government and Department of Business and Economic Development are much more enthusiastic. And they assure us it' all going to be done on private money and not cost the local taxpayers a thing. Of course, they've been working on a state Environmental Impact Statement for two years, and nobody's seen it yet. Nor, as far as anyone here knows, is there any progress on a federal Environmental Impact Statement, which would have to be available before any Defense Conversion Funds were available.

Still, I'm sure it's the State authorities who are the people you're talking to. But before you commit too strongly to anything serious, I'd recommend you come down yourself and have a look around, or at least send a couple of objective observers to get the feel of the place. It's really wonderful dow here, once you realize that you're as far as you can get and still be in the United States. People in Kau love it here, and wouldn't want to live anypla else.

But even when you go to Hilo to do your shopping--I really didn't talk about that, did I?--everybody there who has an "Auntie" in Naalehu, or Waiohinu, o: Pahala, talks about how beautiful it is and how much they love it. But they never come to visit, because it's just too far.

I don't want to seem negative. But if we're going to be neighbors, I think that it's only fair to give you a sense of what things are like here. If yo come over--or send your people--keep in touch. I'll be happy to talk to the: to steer 'em around and show them where things are and what they're like, introduce them to some people who live here instead of Honolulu (the Pittsburgh of the Pacific; believe me, it's really another world there), and cook them the best homemade pizza in the Islands--I don't think it would be fair to bring somebody this far and have them put in a lot of time, effort, and money, and then have to move away because we didn't have what it takes t: meet their expectations.

Very sincerely yours,

Ed Michel

cc: Sen. Daniel K. Inouye
Sen. Daniel K. Akaka
Rep. Neil Abercrombie
Rep. Patsy T. Mink
Gov. John Waihee
Mr. Bob Herkes
Ms. Virginia Isbell
Ms. Helene H. Hale
Mayor Steve Yamashiro
Ms. Keiko Bonk-Abramson
Mr. Mufi Hanemann, DBED
Sen. Andrew Levin
Editor West Hawaii Toda
Editor Hawaii Tribune Herald

25 Aupuni Street
Hilo, Hawaii 96720

March 17, 1993

Dear Keiko,

I want to thank you for your recent meetings in the Kau community to determine what is needed for this area. I also urge you to consider, as a next step in this on-going strategic planning process in Ka'u, supporting the Naalehu Main Street organization in bringing Tom Hudson on-board as a professional planning facilitator. Perhaps the difficulty you encountered structuring your planning meetings to encourage meaningful public input has sensitized you to the need for such professional services as Tom offers. Jon Cole, NMS President, should be contacted for more information on this project at 929-9228.

On another note, Mayor Yamashiro has recently taken the opportunity in *West Hawaii Today* to point out the lack of substance of the most recent "conceptual plan" for the Ka'u rocket launch facility, which was presented with an extravagant cover letter by Mufi Hannemann. These folks at DBEDT and now OSI (Office of Space Industry) haven't seen a dime in income for ten years of effort! In glaring contrast, CBED (Community-Based Economic Development), another branch of DBEDT, gave out a mere million dollars and funded projects netting about $5.3 million in outside funding. A 530% return in the first year with 163 new businesses fostered. Why didn't Mufi sign that testimony to the legislature--Linda Colburn, the capable Chair of the CBED Advisory Board, had to spread that news around.

About the latest conceptual plan, you, our first 'green' representative, know full well that my community has continuing dissatisfaction with OSI's expensive environmental assessment process which has yet to produce an EIS. Thus, I wish to point out several glaring concerns of mine documented in the articles enclosed which include a "letter to the editor" and a copy of the original DBEDT advertisement for consultants. These include:

* The "conceptual plan" had already been completed at the time of advertising for the EIS consultants in May 1988 (see enc.). As well, it is interesting that an EIS that had been in progress since December 1, 1988 would be suddenly "guided", as Anderson claims at the end of the WHT article, by a 1993 "conceptual plan" (whose author, incidentally, is never credited).

* DBEDT has paid for two EIS contracts which promised at least one full year of on-site meteorological and air quality monitoring that would result in a Federal/State EIS document. Now, after a fishy change of EIS contractors and without regard for competitive "bid" procedures, Marilyn Metz (a sole-proprietorship and not a Company as claimed by Anderson), according to this 1993 conceptual plan, is only going to be producing a *STATE* EIS document without the on-site monitoring, and not the joint State-Federal EIS which Hawaii taxpayers bought and paid for.

* Finally, a quick glance at the market data in the conceptual plan reveals that the OSI projections are based on physical launch capacity, and are not realistic projections based on feasible launch demand. It is like saying of the Naalehu Community Theater, which coincidentally is competing with the spaceport project for DBEDT (CBED) economic development funds, that since it has 330 seats at about $3/seat, we will make $1000 per performance--when, in actuality, only 10 to 100 people are likely to attend. Market-wise, OSI continues to ignore the long-term depression in commercial space launch activity as detailed most recently in the reports submitted in November 1992 by the Vice President's Space Policy Advisory Board: *The Future of U.S. Space Launch Capability* and *The Future of U.S. Space Industrial Base*.

Disaffected residents want economic development projects that meet their needs and not those of some bureaucratic agency that is preying from afar. This is why Community-Based Economic Development, a new DBEDT agency, which in its first round of $1 million in 1992 funding has already generated $5.3 mil in outside funding, is to be encouraged rather than the mega-projects that cannot hope to give a decent return to the community for the resources invested.

Instead of pursuing a spaceport, I hope you will encourage DBEDT to put more resources into CBED projects on the Big Island. On the County level, I also ask you to please assist Keiko Bonk-Abramson, the Naalehu Main Street Program, and the Kau Learning Center in their efforts to begin an ongoing strategic planning process in Kau, first to order the need priorities and then to meet these needs in an orderly manner.

Again, thank-you for your vociferous attack on this shoddy effort to push forward a losing project. I hope that we can work successfully to redirect funding toward grassroots economic growth on the Big Island, and away from fruitless boondoogles, like the spaceport.

Sincerely,

Sandra L. Demoruelle

Sandra L. Demoruelle
Box 588
Naalehu, HI 96772

Published May 1988

CONSULTANTS FOR SPACE LAUNCH FACILITY

State of Hawaii seeks qualified prime contractor to develop master plan/environmental impact statement for proposed commercial space launch facility on Hawaii Island.

Launch sites identified. Development timetable/EIS requirements prepared. Conceptual plan completed. State requires comprehensive master plan and EIS meeting requirements of Chapter 343, Hawaii Revised Statutes, State Environmental Impact Statement Rules, and NEPA.

Submit technical qualifications via federal GSA Standard Forms 254 and 255, together with a brief letter of interest.

—254 Architect-Engineer & Related Services Questionnaire

—255 Specific Project Questionnaire

Contractor to be selected via Request For Proposal (RFP) to qualifying companies.

Proposed complex will consist of launch pads, vehicle/payload assembly and processing area, launch control and data processing area, range tracking system, and support infrastructure.

Consultant contract estimated at $800,000-$1 million. Draft EIS to be completed in six months from time of award. State reserves right to reject any or all bidders.

Responses must be postmarked by June 10, 1988 to Manager, Special Projects/Department of Business and Economic Development/P.O. Box 2359/Honolulu, HI 96804. No phone calls.

FOR IMMEDIATE RELEASE

MARCH 15, 1991

FROM: SANDRA DEMORUELLE
BOX 555, NAALEHU HI 96772
929-9244

VIEWPOINT:

Mayor Stephen Yamashiro echoed the feelings of so many of us when he spoke out recently about the latest "conceptual plan" for a commercial rocket launch facility, saying this document "follows the DBEDT tradition of lacking important information about the proposed facility." "There's no meat to it." He went on further to say that "characterizing the report as a dog and pony show for the Office of Space Industry (OSI) was an accurate portrayal."

The scary part about this expensive, heavy-handed, and paternalistic mega-project type of development is that it drains off scarce monetary resources that could be better spent by the state on textbooks for Naalehu Elementary School or improved mental health facilities, for example. Dave Smith, HTH staff writer, has provided valuable information on the costs of the spaceport project for a number of years now, and is continuing to monitor OSI expenditures in current articles. But even with this information made public and in the hands of the legislators, the Governor, and DBEDT bureaucrats, millions of dollars continue to be spent on OSI. It remains a cottage industry for DBEDT bureaucrats which has reaped no economic benefits in terms of *tangible* results for the people of Hawaii.

However, the problems of the costs associated with spaceport development are being well-examined by Hawaii's journalists. My specific concern is that the latest conceptual plan not be totally ignored since it does demonstrate what kind of return the taxpayers of Hawaii are receiving on their multi-million dollar economic investment. Thus, I wish to point out several glaring concerns of mine which include:

* The "conceptual plan" had already been completed at the time of advertising for the EIS consultants in May 1988. As well, it is interesting that an EIS that had been in progress since December 1, 1988 would be suddenly "guided" five years later by an unauthored 1993 "conceptual plan."
* DBEDT has paid for two EIS contracts which promised at least one full year of on-site meteorological and air quality monitoring that would result in a Federal/State EIS document. Now, after an irregular change of EIS contractors and without regard for state competitive "bid" procedures, Marilyn Metz (a sole-proprietorship and not a Company as claimed by a DBEDT representative), according to this 1993 conceptual plan, is only going to be producing a *STATE* EIS document without the on-site monitoring, and not the Joint State-Federal EIS which Hawaii taxpayers bought and paid for.

* And pay we have: For fiscal year ending June 30th 1992, OSI expended a total of $1,598,252.50; for 1991, $1,947,653.70; for 1990, $1,002,199.80; for 1989, $1,688,573.80; for 1988, $435,990.47. Yet OSI Director Ken Munechika maintains only $1,241,000 has been spent on the environmental impact studies and a total of $9.7 million was spent on the spaceport for the past six years. This is clearly incorrect in light of the fact that Future Flight and other OSI programs only take a small percentage of the total budget, the spaceport project requiring the bulk of the funding and administrative support. Money has even been transferred from the Future Flight program to help cover the costs of Marilyn Metz's EIS contract.
* Finally, a quick glance at the market data in the conceptual plan reveals that the OSI projections are based on physical launch capacity, and are not realistic projections based on feasible launch demand. It is like saying of the Naalehu Community Theater, which coincidentally is competing with the spaceport project for DBEDT (CBED) economic development funds, that since it has 330 seats at about $3/seat, we will make $1000 per performance--when, in actuality, only 10 to 100 people are likely to attend. Market-wise, OSI continues to ignore the long-term depression in commercial space launch activity

as detailed most recently in the reports submitted in November 1992 by the Vice President's Space Policy Advisory Board: *The Future of U.S. Space Launch Capability* and *The Future of U.S. Space Industrial Base.*

Disaffected residents, like myself, want economic development projects that meet our needs and not those of some bureaucratic government agency that is preying from afar. This is why Community-Based Economic Development, a new DBEDT agency, which in its first round of $1 million in funding grassroot projects has already generated $5.3 million in outside funding, is to be encouraged rather than the mega-projects that cannot hope to give a decent return to the community for the resources invested.

Instead of pursuing a spaceport, I urge everyone to speak out for more community-based economic development. We need to work together to redirect funding toward grassroots economic growth that fulfil local strategic planning priorities, and away from fruitless boondoogles, like the spaceport. By Sandra L. Demoruelle

(Mrs. Demoruelle, long time opponent to spaceport development in Hawaii, is currently working on her doctoral dissertation, tentatively titled: *Community Based v. State-Sponsored Economic Development in Hawaii: An Evaluation of the Commercial Rocket Launch Facility Project.*)

The Honorable Keiko Bonk-Abramson
Hawaii County Council
25 Aupuni Street
Hilo Hawaii 96720

July 8, 1993

Keiko 7

Dear Councilwoman Bonk-Abramson,

Enclosed is INFS' request to the Ethics Commission to investigate Space Czar Hayward's potential conflicts of interest involving the "spaceport" project.

But an Ethics investigation may only reveal the tip of the iceberg. Isn't it time that the Legislature took a good look at where ALL the taxpayers money has been spent by OSI with only a "paper" agreement with Lockheed to show for it?

We hope you will support us by requesting that the County Council support a resolution calling for a State Legislative Audit of OSI expenditures since it seems that enough improprieties have arisen that the whole of OSI expenditures should be examined (see, e.g., Environment Hawaii, July 1993, enclosed).

We hope that you will be able to help us in procuring an accountability on the part of OSI bureaucrats for millions of wasted tax-dollars.

Thank you for your assistance.

Sincerely,

Sandra Demoruelle

Sandra Demoruelle, Project Coordinator
Informational Network for the Spaceport
P.O. Box 588, Naalehu HI 96772
(808) 929-9244

cc: Hale

FYI

Daniel J. Mollway
Executive Director, Ethics Commission
State Capitol, Honolulu, Hawaii 96813

July 8, 1993

RE: HAYWARD CONFLICT OF INTEREST

Dear Mr. Mollway,

The residents of Green Sands subdivision, variously depicted in DBEDT/Office of Space Industry (OSI) publications as being within the spaceport "population control zone," have long felt that no one in the state bureaucracy was concerned with protecting OUR interests. The revelations made by Pat Tummons in Environment Hawaii (July 1993, enclosed) and review of the receipts submitted by "Space Czar" Hayward have only deepened our concern.

In today's Honolulu Advertiser you are quoted as saying that contractors, such as Hayward, are under a different standard than an appointed official, like Mufi Hanneman, who has recently been called to task for taking a gift of a $3000 honeymoon from a "friend."

We wish to point out that a standard clause exists in DBEDT/OSI contracts covering exactly this eventuality:

> Conflict of Interest. CONSULTANT (or INDIVIDUAL, etc.) represents that it presently has no interest and promises that it shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of the services under this Agreement.

The Ethics Commission is thus requested to examine the potential conflict of interest revealed by Hayward's receipts and his personal acknowledgement of consultant involvement (amount paid by Lockheed unknown to date) with Lockheed while being paid by the state taxpayers after having signed in agreement to the above stated "Conflict of Interest" clause in his contract.

As well, Hayward should make public his degree of involvement with any other organizations so that we may independently determine if there is a conflict of interest with that of the State.

We look forward to your prompt response to these requests.

Sincerely,

SD

Sandra Demoruelle
Project Coordinator
Informational Network for the Spaceport
P.O. Box 588, Naalehu HI 96772
(808) 929-9244

bcc: Keiko Bonk-Abramson

September 21, 1993
Mountain View, HI

To: Governor of Hawai'i
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hi 96813

file

From: Don Rogers
18-4169 Heno St.
Box 1105
Mountain View, HI 96771

Subject: Draft Environmental Impact Statement titled "Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point, Ka'u, Hawaii".

Dear People:

I am a retired Engineer from the University of California at Berkeley, who was involved in research with that institution for thirty years. I moved to Hilo in January of 1989, and built a home for myself here in Mountain View a year later. I am very pro technology, for instance I think that Geothermal power generation is an excellent idea.

I was asked to read the EIS because of my engineering background, and had no opinion on the subject before doing so. After having read it, I can see no reason to spend any more money on this project, and lots of reasons not to. The risks from transporting the toxic and hazardous materials through highly populated areas like Hilo are simply unacceptable. The very large and heavy trucks would destroy highway 11 in a very short time. There are areas along highway 11 (like the one I live in) that can not be evacuated, because there is only one road in. There are many more reasons not to do this project, but they have been enumerated by others, and I will not bore you by repeating them.

I am glad to see that someone is thinking about this part of the state, but wish that the money that has been spent on this project could have been spent on projects that would benefit the state more. The money this project will cost if built could create ten times as many jobs, if spent more wisely. The main reason this Island is so poor is that we import nearly all our consumables. We need to produce more products here. This island could easily feed the whole state. We need factories and farms, not rocket launch facilities.

Please read this and call me with your critique.

Herb Kawainui Kane

Box 163 Captain Cook, Hawai'i 96704
(808) 328 9126

20 September 1993

The Hon. Keola Childs
Hawaii County Council
25 Aupuni St.
Hilo, HI 96720

Dear Keola,

Although my name and the Polynesian Voyaging Society are mentioned more than once in a new circular by "Space Age Publishing Company," which you may have received, I wish to dispel any notion that I or the Polynesian Voyaging Society are in any way supportive of a space launching facility on Hawaii Island. Actually, I am opposed to the idea.

This organization is an enigma to me. I had received two circulars, then a letter asking for my support. My response (enclosed) was negative. Suspicious that this might be another case in the larger scandal of NASA spending tax dollars to advertise itself to the taxpayers, I called Steve Durst (whom I have not yet met), who assured me that his organization is privately funded, yet he would not reveal the source of his funds. My guess is that this organization, which appears to have had several persons on payroll here for several years, may be funded by some aerospace corporation or consortium to stimulate grass roots support for a launching facility here, perhaps recycling profits (originally tax dollars) for this purpose.

Now comes this new 16 page circular with a full color cover. Again, the authors are seeking to incorporate the cultural identity of Hawaiians and Hokule'a with the concept of a space launching facility, for their own promotional purposes.

Sincerely,

cc: The Hon. Keiko Bonk-Abramson (County Council, Ka'u)
Nainoa Thompson, Polynesian Voyaging Society
Ben Finney, Polynesian Voyaging Society

Enclosures:
Kane to Space Age Publishing, 11/5/92
clips from recent circular

12-127

Herb Kawainui Kane

Box 163 Captain Cook, Hawai'i 96704
(808) 328 9126

November 5, 1992

Steve Durst
Leilehua Yuen
Bill Fennie
Space Age Publishing Company
75-5751 Kuakini Hwy Suite 209
Kailua-Kona HI 96790

Aloha!

Thanks for your note and enclosures. I must confess that I'm not enthusiastic about the idea of a space launch facility in Ka'u. The costs/benefits are not clear. One concern is that South Kona is an airshed area which tends to hold airborne pollutants. The effects of volcanic smog suggest that the addition of man-made pollutants may be detrimental to our orchards and catchment water. But there are larger concerns.

At a time when we as a nation have spent ourselves into unimaginable debt, yet without adequately addressing a host of pressing domestic problems as well as those associated with a relentless degradation of the earth's environment, I feel outraged to see taxes (state and federal) spent in exploring the possibilities for space adventures which I view as low priority if not non-essential. Economic motives are not sufficient, the ravages of driftnetters or the destruction of old-growth forests are also based on economic motives.

I would suggest you ease up on trying to "focus on the relationship between Ka'u and the the great Polynesian/Hawaiian voyages." Much has been made of Ka Lae as an arrival or a departure point for the voyages of antiquity, but this has been based only on the discovery of material which produced an early radiocarbon date—one which is regarded as questionable because later material was found under it. Aside from this, there is actually no evidence to give Ka Lae or Ka'u this significance. Moreover, the earliest date for human occupation now appears to be on Oahu (A.D 100 + or - 100). There is no reason why Ka'u's position as the most southern district should make it the most likely to be the landfall of Hawai'i's discoverers or of later voyagers.

When one considers the vast differences between the ancient Polynesian culture and the modern culture—differences in social structure, decision making, economic mode, and world view, it becomes difficult to draw any real comparison of the space age with the ancient voyages. I'm one of many who are beginning to feel that there has been too much radio chatter between *Hokule'a* and the space capsule; that this has become a sideshow that obscures the purpose of *Hokule'a*.

Sincerely,

SPACE AGE PUBLISHING COMPANY

FOR IMMEDIATE RELEASE

Contact: Tel 808-326-1910
Fax 808-326-1825
(Message 808-326-2014)

"PACIFIC ALOHA SPACEPORT" STUDY NOW AVAILABLE

Kailua-Kona, HI, 17 September 1993 -- Space Age Publishing Company and the now-forming Hawaii Island Space Exploration Office announce the release of the Pacific Aloha Spaceport Feasibility Study.

"This study represents a breakthrough in the stalemated Hawaii spaceport debate," said editor and publisher Steve Durst. "It offers a new alternative, both affirming space exploration's great benefit and furthering a benign environment and pacific way for Hawaii."

Focusing on geography and the "culture of Aloha" as unique and central assets for space endeavors from the 50th state, the study maintains that Hawaii could provide truly peaceful and commercial space travel around the year 2000.

The 4-color cover, 16-page bound report represents six years of research and over a year of production time by the editorial staff of Space Age Publishing Company. It is available at a cost of $50, or $25 for subscribers to Space Fax Daily or Space Calendar. Hawaii residents are eligible for a significant kama'aina discount.

A public meeting will be scheduled in early October to discuss the study and the formation of the Hawaii Island Space Exploration Office.

- end -

Hawaii Office · *75-5751 Kuakini Highway, Suite 209 · Kailua-Kona Hawaii 96740 USA · 808-326-2014 / 808-326-1825 fax*
California Office · *10020 N. De Anza Boulevard · Cupertino CA 95014 USA · 408-996-9210 / 408-996-2125 fax*

12-128

POLYNESIAN VOYAGING SOCIETY

The Polynesian Voyaging Society continues to lead the way to a new Hawaiian future by exploring the accomplishments of the past. Since 1976, the society has taken on endeavors from reinventing ancient Polynesian navigational techniques to communicating with an orbiting Space Shuttle. This society of modern-day traditional seafarers is teaching young Hawaiians to navigate the reefs of cultural change with pride and confidence.

Pier 35, Honolulu HI / 808-531-7240

Hawai'i Island Space Exploration Office

The Hawaii Island Space Exploration Office seeks to facilitate space education and enterprise, and to disseminate space development information to those interested in environmentally sound, peaceful, commercial, scientific, and educational uses of space.

Now forming in Kona, West Hawaii

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Future Flight Hawaii 94:

Apollo, The Next Generation

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Future Flight provides hands-on sc science experience with reside space camps using the natural human-made resources of Hawai land to simulate planetary miss From snorkling to hiking lava flows ture Flight demonstrates the fun of le ing in a tangible way. The progra success can be measured not onl the international attention it has tracted, but by the number of stud who re

Office of Space Industry — DBE
PO Box 2359, Honolulu HI 96
808-933-4038 (Hilo) / 808-586-

Dedication

This study is dedicated to the Dynamic Spirit of Hawai'i, and its People.

From Native Hawaiians to tourists, all here are wayfarers or descendents of wayfarers. This study is dedicated to that questing spirit of humanity which led humans to these islands and will lead humans to the stars.

Pacific Telecommunications Council

Pacific Telecommunications Council promotes interconnections between businesses around the Pacific Rim.

2454 S Beretania St / Suite 302
Honolulu HI 96826
808-941-3789

Front Cover

From Hawai'i to the Moo
— Henry Ly

A rocket leaps into space fr offshore, a trail of steam lit the Moon, toward which it voyage. Passengers watch active eruption on Mau Loa's southern flank, its re glow echoed by Hokule'a. Arcturus, Hawai'i's zenith sta Astronomers study the heave from the summit of Mauna Ke highest point in the Pacific Bas

Lunar Power System Coalition

5080 Shoreham Place
Suite 201
San Diego CA 92122
619-587-0970; fax, 619-458-1624

The Lunar Power System Coalition seeks to provide economically and environmentally feasible power to Earth through Lunar-based enterprise. Such an endeavor would benefit all of humanity.

UNITED NATIONS

Outer Space Affairs / New York NY 10017

The United Nations continues into the Space Age its role of facilitating international endeavors. A major participant in International Space Year 1992, the U N includes in its activities assistance to countries seeking to better the lot of their people through space development. Of this study, Nandasuri Jasentuliyana, U N Office for Outer Space Affairs director, wrote: "The Pacific Aloha Spaceport. . . seems worthy of further exploration. . ."

Aerospace States Association

130 State Cap
Denver CO 80203-17
303-866-2087, fax 303-866-54

A consortium of state and private e tities seeking to promote commerc development of space throughout t US

canoe. 'If you sail West from Europe, it's almost impossible to miss North America,' he says. The Polynesians, on the other hand, found their way to numerous groups of tiny islands hidden in the bosom of an enormous ocean — a far more impressive navigational feat.

The most important policy objective of the International Space Year . . . is to instill a new Space Age frame of reference in the thoughts and actions of governments and individuals."

—The late U.S. Senator Spark M Matsunaga, Hawaii

Dr Ben Finney, Chairman of the Anthropology Department at the University of Hawaii - Manoa, points out that "Europeans did not colonize the mid-Atlantic islands of Madeira and the Azores until the 15th century, 3,000 years after the stone age voyagers whose descendants were to be the first Polynesians reached the mid-Pacific archipelegoes of Fiji, Tonga, and Samoa." He reasons that the Europeans did not have any 'stepping stones' nearby to lure them into the ocean.

Finney goes on to note that the existence of the Moon and

Pacific Rim / Global Nations Involved in Space Enterprise

Australia is looking into a launch site of its own and is pursuing strong efforts to create a space technology support community at the university / industry level;

Indonesia relies heavily on space telecommunications to link the 13,677 islands of its far-flung nation and is engaged in a committed effort to move into techno-industrial parity with first-world nations;

China, potentially one of the economic giants of the 21st century, currently is gaining ground in the rocket launching arena with a sophisticated family of vehicles;

Russia, a world leader in space technology, is bound to transform humanity's access to space;

Japan participates on a regular basis in international scientific investigations using home-developed launch technology and high-grade electronics;

Canada leads the world in robotic manipulation hardware for space applications and has an active human spaceflight program;

Mexico has sent one astronaut into space aboard the U.S. Space Shuttle and is cooperating with the state of Florida on a series of university level sounding rocket launches;

The USA, a world leader in space development, is slowly moving toward a truly commercial space environment, in which private enterprise can play an increasing role.

In addition to the Pacific Rim nations, Europe, India, S America, Africa, and the Middle East — in roughly descending order — all possess space exploration and technology development programs.

Herb Kawainui Kane, an instigator in the project to build the Polynesian voyaging canoe Hokule'a, stands before her at Miloli'i harbor on Hawaii Island, top. Artist, anthropologist, and preservationist, Kane has been active in a Hawaiian renaissance. Hokule'a, a performance-accurate reconstruction of the great canoes which brought the forebears of Hawaiians to these islands, has been nicknamed the 'Spaceship of Our Ancestors', center. Nainoa Thompson, right, has devoted his life to reconstructing the astronavigational skills of his ancestors and leading young Hawaiians on a voyage of rediscovery (Photos Hawaii Maritime Center / Will Kyselka, 'An Ocean in Mind').

considering overall environmental impact, the question of hydrogen production needs to be addressed. "How are you producing the liquid hydrogen?" he asks. "By burning hydrocarbons?"

According to Hunter, a hydrocarbon / oxygen combination, such as the kerosene / oxygen combination used in the General Dynamics Atlas first stage booster, "is not that dirty. It puts out water and carbon dioxide. Actually, it puts out carbon monoxide as well, but most of that converts to carbon dioxide during the afterburn. The amount of carbon dioxide emitted is miniscule in comparison to the levels of carbon dioxide in the atmosphere — something on the order of 10^{-13}.

"The case can be made," Hunter concludes, "that hydrocarbon / oxygen rockets are environmentally good enough."

General Dynamics, which has probably spent more money on developing cryogenic propulsion systems than any other major rocket launching company, is examining the possibility of producing an environmentally friendly booster to fit the lightsat niche. Lightsats are small satellites designed to fulfill one specific, possibly short-term, mission at a fraction of the cost of heavier, more payload intensive platforms.

Ed Ward, Director of International Marketing for General Dynamics, said he is convinced the market for lightsats is much greater than expected but, to be competitive, launches would "need to come off the equator."

Producing a small rocket using cryogenic propulsion poses specific and challenging engineering problems. Jim Bennett, a California space consultant and former President of American Rocket Co., notes that launchers use hydrocarbons instead of hydrogen because hydrogen is bulky. "The cost per pound of propellant is not an issue; the issue is cost per pound of rocket," he says, pointing out that the increased structure to hold the bulkier fuel adds up to a heavier rocket.

On the other hand, Bennett adds, "people have the assumption that a manned system must be large," which is not so. The Gemini crews were launched on Titan 2 boosters, he notes. A cryogenic microsat launcher is probably just a matter of time.

The developing field of hybrid launch technology — half solid, half liquid propulsion — offers a further alternative. Hybrids use liquid oxygen to burn a synthetic rubber compound, hydroxyl terminated polybutadine (HTPB), which has an environmental impact similar to the Atlas booster described above.

"There is no excuse whatever for designing rockets using materials that will release toxics into the atmosphere, such as aluminum, hydrochloric acid, and chlorine, which affects the ozone layer."

— Robert M. Bowman

Amroc asserts that hybrids "...can not explode...can be developed quickly at low cost...are environmentally benign...[and] have greater economies of scale than either solid or liquid motors."

Development of low-impact fuels and technologies for a Pacific Aloha Spaceport is of high priority. One early respondent to the study has offered assistance in this area, and others are likely to come forward. T.R. Gopalakrishnan Nair, MTech, PhD, and International Space University participant working at the Liquid Propulsion Centre at Trivandrum, India, cites experience in technology related to the design, development, and launch of space vehicles in a request to participate in further work on the Pacific Aloha Spaceport.

Conclusions

To realize a Pacific Aloha Spaceport, the enterprise must be global, local, and 21st Century in spirit and technology.

Space being the common heritage of all life forms, space exploration may be most appropriate in the context of Aloha, cooperation, and a willingness to use all knowledge gained for the common good of all.

Major characteristics for a successful venture include: 1) that its nature be 'truly pacific'; 2) that it be a launch pad first for space, then to the Moon and other worlds; 3) that it involve exclusively humanitarian / commercial payloads; 4) that it be located offshore Ka Lae; and 5) that it employ advanced propulsion systems proven clean and safe for the environment.

Before making any move to establish a spaceport in the area of Hawaii Island, first space / science education and awareness activities should be organized throughout the state.

If there is to be any launch site — human or otherwise — in Hawaii, it should initially be focused on, and throughout its lifetime continue to support, educational goals.

A Hawaii spaceport could include an attached educational facility that to train the youth of Hawaii in astronomy, navigation, and all sciences related to the stars and the Moon. Providing the infrastructure to enable Hawaiians to relearn ancient skills using the most modern technology would help a formerly disenfranchised people to regain pride and to develop a technology-based economy for the modern world that is related to their own history, creating a place for them to become leaders in the Space Age.

A high technology endeavor, such as an environmentally low-impact spaceport focused on humanitarian activities, could aid in returning Hawaiians to a position of prominence in science and exploration.

Any facility, wherever it is located, should be built only after technology to mitigate any negative impacts is identified and incorporated into the final design. The facility must be kept open and available for inspection by all interested parties from the state, the nation, and the world. No military or aggressive business should be allowed.

The existence of an active launch facility — onshore or offshore — would stimulate interest that would foster growth of educational programs, eventually providing local talent for technical, engineering, and administrative positions. One valuable, and readily available, resource is Affiliate Campus status with the International Space University.

Whatever activities are conducted in Hawaii regarding space exploration, they should be for the purposes of benefitting 1) the people of Hawaii, 2) the USA, and 3) international cooperation and interests.

Pacific Aloha Spaceport provides the means to integrate Aloha culture with the high technology / exploration leap into the cosmos. The inclusion of alternative, potentially conflicting, viewpoints creates a new order of initiative geared toward the 21st Century rather than a repetition of exploitive scenarios.

Hawaii can become the most popular place on Earth for people both to HoneyMoon, and to go to the Moon.

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Projects

Lunar Initiative / Return to the Moon

Ad Astra Initiative

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Pacific Aloha Spaceport Feasibility Study

Editor / Publisher
Steve Dutz

Associate Editor, Hawaii
Bill Fennie

Hawaii Editor
Leilehua Yuen

Associate Editor, California
Brian McMahon

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Acknowledgements

The publisher wishes to remember the caring and daring of his late father Royal, who honeymooned with his wife Shirley in Hawaii in 1940. His universally acknowledged gentleness and empathy toward all — traits shared by his son Peter and daughter Leslie — carried forward the true spirit of Aloha.

Inspiration and support for this study also owe much to the faith and persistence of Joann my wife, daughter Sidra and son Arian, who voyaged to Hawaii over great distances.

Finally the full cooperation and commitment of Space Age editorial associates Bill Fennie, Leilehua Yuen and Brian McMahon have proven indispensable throughout this enterprise.

Mahalo / Ad Astra — SD

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Imua I Na Hoku
. . .Forward to the Stars

Back Cover: A star map of the sky above Hawaii in June, from the book *North Star to Southern Cross* by Will Kyselka, University of Hawaii Press

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10-28-9

Councilwoman Bank-Abramson
25 Apuni St
Hilo, Hawaii
96720

Dear Councilwoman Bank-Abramson-

Hi, my name is Mandi Benton, I am a 10th grader at Konawaena Highschool. I am writing to you about the Spaceport in Ka'u.

I have lived in Kona all my life, and I want Kona, and the whole Island to stay beautiful. The space port will (as I have heard) make new jobs, blah, blah, blah. What about the fact that it will polute our air and water, therefore creating birth defects in children? How could these problems be overlooked just to have more jobs?

The polution is also said to be blown to Kona, a tourist town. Tourism, our main industry, could be hurt by the spaceport. When tourism is hurting, Kona is hurting, and we would be worse off then, then we are now.

If you could send me some information and your thoughts on the spaceport I would be very greatful. Thank you for being able to let me write.

my address:
P.O. Box 262
Capt Cook, HI. 96704

Thank you,
Mandi Benton

Resp

Keiko Bonk-Abramson
25 Aupuni St.
Hilo, HI 96720

October 28, 1993

Dear Ms. Bonk-Abramson,

My name is Robert C. Melerdiercks. I am a student of Konaweana High School. I respect your position as a politician. And want you to be aware of the pollution and danger from explosions the Space-port will bring to us if it is allowed too. I want the land to be preserved, the air to be clean and the ocean to remain at peace. I think that a space-port would be cool but there is too much at stake.

Mahalo for your interest,

Robert C. Melerdiercks

Robert C. Melerdiercks
83-5397c Mamalahoa Hwy.
Capt. Cook HI. 96704

12-131

WAIKAALULU RANCH AND FARM
P. O. Box 432
PAAUILO, HI 96776
(808) 775-9931

May 28, 1993

Mr. Taka Domingo
Hawaii County Council
25 Aupuni Street
Hilo, HI 96720

Dear Taka:

This latest tactic by the Waihee administration regards their spaceport project is more than what reasonable folks can bear. They are effectively telling us that "we're going for it regardless of the consequences, costs, benefits, impacts, or public opinion" and, implicit in their EIS after-the-fact is that this key decision-making document will be tailored to support an A PRIORI unilateral decision made years ago by the governor.

I believe it is time for our local representatives to formally go on record that Hawaii will not support this project unless or until it has been clearly demonstrated thru the EIS process that the overall benefits of this project will far outweigh the many fiscal, environmental, and social costs involved.

I strongly urge you to sponsor and put forth a resolution to this effect and I will gladly assist you in marshalling ample public support for a much-needed position from our County Council regarding this contentious and mismanaged project. I would add parenthetically that such a resolution should specify that a full-blown EIS (and not an environmental assessment as is now being mentioned) is warranted for a project of this scope.

Aloha nui loa,

Bob

Bob Williams

Dear Keiko;

Thank you for your letter of Oct. 7th,

Here are copies of all the letters I've received so far in response to my letter about the proposed space port (except a copy of yours) I thought you might find them interesting and hopefully helpful.

Warmest Regards,
Alice

(808) 929-8126

HOUSE OF REPRESENTATIVES
STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

October 7, 1993

Ms. Alice R. Klein
P. O. Box 6448
Capt. Cook, HI 96704-6448

Dear Ms. Klein:

This is in response to your letter dated September 19, 1993 concerning the proposed "space port" in Ka'u. I appreciate your comments.

Just for the record, I am a third generation Big Islander and I do live in Ka'u.

I was at the luncheon in Hilo when Mr. Buyers, President of C. Brewer, made the announcement about a space port in Ka'u. In a grand manner he announced that we would be sending men to the moon from Ka'u. I have been to Cape Canaveral and I have witnessed the launching of a maned space mission. I also have a number of friends who are astronauts, among them Buzz Aldrin, the second man to walk on the moon. I called Buzz shortly after the original announcement to ask his opinion. He said in effect, "you will not be able to supply the required infrastructure for such a mission." I asked him about a lower level of launch that would orbit communication or weather satellites. He felt that there might be some economic justification to such lower levels of space activity. At the time, I did not want to write off any economic opportunity and took the position with the Governor in favor of such lower level of activity. This was in 1988. I was out of office from 1988 until 1992. In the ensuing years I met with Buzz about on an annual basis over dinner and conversation.

It was not until early 1992, when I decided to run for the House of Representatives that I again discussed the space port issue with him. At the time he told me that to hold such a venture out to the people as an opportunity for jobs would be a cruel hoax. In his view, there were just not going to be any customers and modern technology would enable these smaller satellites to be launched by airplane. It is also his opinion that these satellites will be getting smaller and smaller. Buzz, because of his position in history and the fact that he is still active in the space business, will not make these opinions public and I will not ask him to.

During the 1992 campaign, based on Buzz's scientific judgement and on my evaluation of the impacts on Ka'u, I stated that I would not vote in favor of any additional funding for a space port at Ka'u and that the State should abandon the project and get on with the development of economic opportunities more in keeping with the rural agricultural lifestyle of the region.

I continue to hold this view and will continue to work with the community and State and County officials to explore more appropriate economic ventures.

Thank you for sharing your views with me.

Sincerely,

Bob Herkes
4th District

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

MUFI HA
BARBARA KI
TAKESHI Y

September 28, 1993

Ms. Alice Klein
P.O. Box 6448
Captain Cook, HI 96704-6448

Dear Ms. Klein:

Thank you for your letter of September 19, 1993, concerning the state Draft Environmental Impact Statement (EIS) for the proposed commercial satellite launching facility.

Your concerns on the changes to Ka'u's lifestyle and the use of land will be addressed, and our response will be sent to you as soon as it is available. Both the response and your letter will be printed in the Final Environmental Impact Statement for this project.

We appreciate your input in the EIS process.

Sincerely,

Takeshi Yoshihara
Deputy Director

OFFICE OF THE LIEUTENANT GOVERNOR
LEIOPAPA A KAMEHAMEHA
STATE OFFICE TOWER
HONOLULU, HAWAII 96813

BENJAMIN J. CAYETANO
LIEUTENANT GOVERNOR

September 24, 1993

Alice Klein
P.O. Box 6448
Captain Cook, HI 96704-6448

Dear Ms. Klein:

Thank you for writing to me about the proposed spaceport at Ka'u. I appreciate your feelings for the land and its value.

Although I was initially a supporter of the spaceport, I was surprised by the recent consultant report that concluded that the probable benefits to the State amounted to only $10 million. I am reviewing my position on the spaceport based on its impact on the land and estimated benefits, and will make my decision when my study is completed.

I am grateful to you for sharing your thoughts and I hope you will keep in touch with me in the future.

With warmest regards,

Aloha,

Benjamin J. Cayetano
Lieutenant Governor

12-134

H. HALE

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

September 27, 1993

Alice Klein
P.O. Box 6448
Captain Cook, HI 96704

Dear Ms. Klein:

Keiko and I introduced a Resolution to appose the creation of a state spaceport authority. It failed because our Council majority, Schutte, DeLima, Arakaki, Rosehill and Domingo voted against it. Unfortunately, Keiko was not there since she was on the mainland.

I agree with you but you must contact the "boys".

Aloha,

Helene H. Hale
Councilwoman

HHH/ctd

[redacted]
OLT
PRESIDENT
RD M. MATSUMOTO
JORITY LEADER
DISE YAMASHITA TUNGPALAN
ASSISTANT MAJORITY LEADER
DONNA R. IKEDA
MAJORITY FLOOR LEADER
RANDY IWASE
ASSISTANT MAJORITY FLOOR LEADER
BERTRAND KOBAYASHI
MAJORITY POLICY LEADER
ANDREW LEVIN
MAJORITY CAUCUS LEADER
MIKE McCARTHEY
MAJORITY WHIP
MARY GEORGE
MINORITY LEADER
RICK REED
MINORITY FLOOR LEADER
FIRST DISTRICT
MALAMA SOLOMON
SECOND DISTRICT
RICHARD M. MATSUMURA
THIRD DISTRICT
ANDREW LEVIN
FOURTH DISTRICT
RUSSELL BLAIR
FIFTH DISTRICT
JOE TANAKA
SIXTH DISTRICT
RICK REED
SEVENTH DISTRICT
LEHUA FERNANDES SALLING
EIGHTH DISTRICT
DONNA R. IKEDA
NINTH DISTRICT
MATT MATSUNAGA
TENTH DISTRICT
BERTRAND KOBAYASHI
ELEVENTH DISTRICT
ANN KOBAYASHI
TWELFTH DISTRICT
CAROL FUKUNAGA
THIRTEENTH DISTRICT
ANTHONY K. U. CHANG
FOURTEENTH DISTRICT
MILTON HOLT
FIFTEENTH DISTRICT
NORMAN MIZUGUCHI
SIXTEENTH DISTRICT
REY ORNALITY
SEVENTEENTH DISTRICT
ELOISE YAMASHITA TUNGPALAN
EIGHTEENTH DISTRICT
RANDY IWASE
NINETEENTH DISTRICT
DENNIS M. NAKABATO
TWENTIETH DISTRICT
BRIAN KANNO
TWENTY-FIRST DISTRICT
JAMES AKI
TWENTY-SECOND DISTRICT
GERALD T. HAGINO
TWENTY-THIRD DISTRICT
MIKE McCARTHEY
TWENTY-FOURTH DISTRICT
STANLEY T. KOJI
TWENTY-FIFTH DISTRICT
MARY GEORGE
CHIEF CLERK
T. DAVID WOO, JR.

12-135

The Senate
The Seventeenth Legislature
of the
State of Hawaii

STATE CAPITOL
HONOLULU, HAWAII 96813

September 29, 1993

Ms. Alice R. Klein
P. O. Box 6448
Captain Cook, HI 96704-6448

Dear Ms. Klein:

Thank you for your letter, dated September 19th, in opposition to a proposed spaceport in Ka'u.

As I hope you know, I have come out firmly against the proposed spaceport. I appreciate your support, and hope that you will continue your lobbying efforts in the months ahead.

Very truly yours,

ANDREW LEVIN
Senator, Third District

AL:ck

Robert M. Rees

The Spaceport: Launch pad for deception

Our governments seem to have adopted the gimmickry of paid public relations as a substitute for informed public discussion. It's not too late, however, to try a different approach with regard to the euphemistically named "spaceport," the proposed Big Island facility for commercial rocket launchings. That different approach is to launch a new and untried vehicle — the whole truth.

A recent letter to the editor of one of our newspapers addressed the spaceport and got it right: "If the state is serious about developing technologically advanced projects, it has to ... stop treating its citizens like a bunch of idiots."

The Office of Space Industry (OSI) is part of the Department of Business, Economic Development & Tourism. In the six years of its existence, OSI has spent $7 million promoting a missile launching site at Palima Point in Ka'u. (These funds, according to the authoritative newsletter "Environment Hawaii," include a fee of $484,000 paid to Ret. Adm. Thomas Hayward for his lobbying of Lockheed Missiles & Space to build the facility.)

Eager for favorable publicity, Gov. John Waihee in May prematurely announced the effort had paid off and Lockheed had agreed to cooperate on the project. (Lockheed has yet to agree to any investments and felt the need to issue a clarification after Waihee's announcement.)

DBEDT meanwhile has released an environmental impact statement. Violating its agreement with the Legislature, DBEDT decided not to follow the federal standards for such a study. "This decision," said a DBEDT spokesman, "is based on local considerations and issues that require timely release ... ." The Big Island's "Ka'e Landing" newspaper, reporting on the EIS, cited the health risks and the environmental dangers that accompany a steady diet of rocket launchings.

And, it turns out the economic benefits of a spaceport were overstated by its early promoters. In 1987, when the project was backed by C. Brewer & Co. Ltd., and when current DBEDT Director Mufi Hannemann was hired by "Doc" Buyers to sell the idea to the Big Island, there was talk of 10,000 jobs. Now the state anticipates a workforce of maybe 200. (It's difficult to tell because DBEDT's slick "Conceptual Plan" assumes three or four missiles are being launched at all times in what is described as "full build-out.")

Green Party activists noted "nearly all the permanent jobs created by this rocket facility would go to off-island scientists and technicians, not local residents." DBEDT itself said about half the workforce will be "transient."

True to form, DBEDT at first attempted to keep to itself a financial study which showed that under even optimistic assumptions no financial gains are possible until the next century. Big Island Sen. Andy Levin said, "Frankly, I'm surprised at how small the potential economic benefit ... is compared to the agony that will be caused by trying to get this project through ... ."

Now, what adds Hawaii's unique loony-loons touch to all this is that even as it's happening one of Hawaii's few existing high-tech firms, Intelect Inc., is completing the process of reducing its staff by over 100 while transferring workers to Texas. One reason for this reduction: The state said it lacks the funds to do a study on whether to help an existing high-tech company stay in business.

In short, we are paying millions to lure someone to launch Atlas missiles from Palima Point while refusing even to consider whether an existing and environmentally clean business deserves state investment.

The cause of this is our government's chronic emotional problem of defending all it has ever done as perfect. The state now seeks only to justify its $7 million effort on behalf of a spaceport. It's unlikely that DBEDT, whose director is in a state of perpetual campaigning for office and who has been involved one way or another with trying to sell the plan since 1987, will announce the idea was a mistake.

Still, just this once, just as a trial balloon, the state might try launching the whole truth. We'd all be better off.

September 22, 1993

The Honorable Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Sir,

Please do not allow a spaceport here in Hawaii. Not in the state or on the Big Island. It will adversely and irreversibly affect the culture, environment and health of our people. I speak for myself and for every person I have discussed this with.

Sincerely,

A registered voter living on the Big Island

cc: U.S. President William Clinton
Senators: Daniel Akaka
Daniel K. Inouye
U.S. House Patsy Mink
State Senator Andrew Levin
County Council Keiko Bonk-Abramson

12-136

September 21, 1993

Councilman Keiko Bonk-Abramson
25 Aupuni Street
Hilo, HI 96720

Dear Councilman Bonk-Abramson:

For 35 years I have lived and travelled about these bountiful islands, enjoying the natural beauties and varied attractive habitats of each, delighting in the clean air and clear waters.

During my earlier years on Oahu, I could not help but note the impression of superior health and serenity in crowds there in contrast to those on the mainland.

Since residing in the relative peace of this spacious island, I have noticed how the people who have moved here seem to improve in their general well-being, regardless of their age, to the point where it seems most fitting that this island orient its future toward becoming a restorative center for the States, if not for the world. It is difficult to visualize a more comfortable climate, inspiring surroundings, hospitable populace, unique Hawaiiana, conducive atmosphere and accommodation space for rest and recreation, and even retraining. Surely, so ideal a combination is rare, and a prize not to be sacrificed.

Such a vision does not include any room whatsoever for a space airport under any conditions. Those in my acquaintance who might accept such an intrusion into the basic nature of this Pacific Island cannot be seeing too clearly or thinking into the future with sufficient breadth of imagination, to forestall ruination of this divinely conceived place, in my view of realities. And I cannot comprehend how people in families with children can even consider such an eventuality as desirable or suitable for these offspring, or beneficial for their upbringing.

In case this whole space project is kindled by money motives, please reconsider, in the frame of the degraded ecological state of our planet. At this stage, how can financial gain remain a priority with anyone?

Councilman Keiko Bonk-Abramson
September 21, 1993
Page 2

By a conversion to a health center approach, many of our local institutions could profit while upgrading the situation of people in residence here: ~~via~~

1. More diversified agriculture to ensure food freshness (with greater nutritive support) and sufficient quantities locally.
2. Teaching jobs for sundry professionals.
3. A wide range of care helper jobs.

With much aloha from Hawaii,

E. D. Quimby (H.O.V.E.)

E. D. Quimby

P.S. KEIKO, BEST WISHES, PRAYERS + STRONG INTENTIONS. AND CONGRATULATIONS TO YOU FOR YOUR STAND.

DEV Q.

P.P.S. MY COMPUTER FRIEND DIDN'T INCLUDE THE LISTING OF OTHER COPIES TO: GOV WAIHEE, LT. GOV CAYETANO, MAYOR YAMASHIRO, REP HERKES, SEN. LEVIN, OUR GRAND LADY HALE. FOR THE LOCALS. AM CONTEMPLATING MORE ON THE MAINLAND.

E. D. Q.

September 20, 1993

Councilman Keiko Bonk-Abramson
25 Aupuni Street
Hilo, HI 96720

Dear Councilman Bonk-Abramson:

It is the concern of all people, animals, and plant life that abides on the Big Island of Hawaii, more precisely the Ka'u District, that I write this letter.

We of this area (and I am sure my views are shared by many concerned citizens) are privileged to share one of the rarities of our time, the wild, pristine qualities of nature that we are allowed to enjoy during our brief stay on planet Earth. We all must agree that as time goes by, more and more of this rarity is slipping away, being destroyed by man's greed and obvious short-sightedness of the future of our planet. We of the Big Island especially have a duty to guard and protect this gift from God and keep this area and all places on Earth protected from threats by unnatural practices that would destroy the very home we call planet Earth.

A spaceport in Ka'u is not acceptable if this area is to be kept pristine. It is not productive. It is nonconducive to the environment. No one wants it and no one needs it.

Sincerely,

John Elhard

John Elhard

September 5, 1993

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OFFI...

SPACEPORT COMMENTS TO ALL COUNCIL MEMBERS:

What is the Department of Business, Economic Development & Tourism (DBEDT) hiding? What are they planning to launch from the proposed Ka'u Spaceport that is so terrible that it must be kept a *secret?*

In my opinion, EIS contractor appears to have done an excellent job. However, there is a serious problem in the economic portion of the EIS -- the contractor was forced to rely upon data supplied by DBEDT. In other words, DBEDT hired the EIS contractor to cite DBEDT as proof of economic benefits. Moreover, the economic data are based upon *secret* data.

I received a letter from the Executive Director of the Office of Space Industry, Ken Munechika, dated August 26, 1993, which states:

"After consulting with the Attorney General's office, we have been advised that this material is predecisional and deliberative in nature. In addition, the information contains input from Lockheed which is confidential and proprietary. Withholding predecisional information is consistent with the Office of Information Practices' opinion letter 91-16. On this basis, we are electing to withhold the financial projections from public review."

Basing the economic benefits portion of the EIS upon secret DBEDT data, means that the economic benefits portion of the EIS is essentially worthless -- an illusion.

Why was it necessary to resort to *secret* economic data? What is DBEDT hiding?

Harry Truman once said "Secrecy and a free, democratic government don't mix." If one wonders why Americans have lost faith in their government, one needs look no further than DBEDT!

Aloha,

Jay Hanson, Member of the Hawaii County Planning Commission
78-6622 Alii Drive,
Kailua-Kona, HI 96740
Phone 322-7268 -- Fax 329-6523

COMM. NO. 548.18
To: PC

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
Office of Space Industry

JOHN ... MUFI HANN... Dir... KEN K. MUN... Executive Office of Spac...

August 26, 1993

Mr. Jay Hanson
78-6622 Alii Drive
Kailua-Kona, Hawaii 96740

Dear Mr. Hanson:

This is in response to our telephone conversation in which you requested the financial projection for the proposed launch facility.

After consulting with the Attorney General's office, we have been advised that this material is predecisional and deliberative in nature. In addition, the information contains input from Lockheed which is confidential and proprietary. Withholding predecisional information is consistent with the Office of Information Practices' opinion letter 91-16. On this basis, we are electing to withhold the financial projection from public review.

For a general overview of the launch facility's financial projection, please refer to Chapter 11 of the Conceptual Plan and Project Description (DBEDT, February 1993). I apologize if this causes you any inconvenience.

Sincerely,

Ken K. Munechika
Executive Director

KEIKO BONK-ABRAMSON
Councilwoman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

August 11, 1993

MEMORANDUM TO: SPENCER K. SCHUTTE, CHAIR, HAWAII COUNTY COUNCIL

FROM: KEIKO BONK-ABRAMSON, COUNCILWOMAN

RE: THE PROPOSED KA'U SPACEPORT

Please have the attached information numbered, referred and then placed on the appropriate committee agenda for consideration.

Thank you.

Attachment

KBA/ctd

12-139

AN EXPLANATION

Sifting through the reams of material, both pro and con, concerning the proposed Rocket Launch Facility (RLF) for the Ka'u District of the Island of Hawai'i, has been a herculean effort. Verifiable fact forms only a tiny percentage of the information in the public domain, the majority of which appears as emotional invective, public relations folderol, and outright lies meant to dazzle and confuse the uninformed on both sides of the RLF debate. The facts we HAVE established are as follows:

* According to Dr. Robert Bowman, Ph.D. in Nuclear Engineering, former director of the Star Wars program under Presidents Carter and Ford, recipient of the Eisenhower Medal (a Peace Prize national award), former manager of Advanced Space Programs at General Dynamics, Corp. and one of the US's foremost authorities on space and international security matters, in statements regarding the proposed Ka'u Rocket Launch Facility, he is quoted as stating:

* "Employment potential for Hawaii people is out of the question. After the raw construction of facilities (roads, blockhouses, launching pads) all refined installations and launching procedural work will be done by specially trained outside personnel."
* "No one will hire unemployed people in Hawai'i to do this highly complicated, highly CLASSIFIED work."
* "... commercial space programs will NOT support the facility, simply because there are very little commercial programs around, and eventually, if not immediately, US military experimental launches will be its sole function."
* "What will happen to Hawai'i is the contamination of the shorelines, the water and the reefs."
* "Tons of aluminum hydroxide and hydrogen chloride will be released in the atmosphere just above the site ... enormous fish kills will occur after every launch."
* "The air, land and water will also become saturated with aluminum hydroxide and hydrogen chloride, which becomes hydrochloric acid on contact with the ocean water ... and the life cycle of the reefs will come to an end. The effects of a launching will be disastrous to Hawaii Island's ecology."

WHAT WE KNOW TO DATE

* Regarding the commercial economic viability of this satellite launching facility, there are two major strikes against the proposal:

1) Existing technological advances that have made the facility, as proposed to the public, obsolete, and

2) Existing worldwide commercial launch facilities already competing for international corporate and government markets that are marginal at best.

1) EXISTING HIGH-TECH ADVANCES

In 1988, Orbital Sciences Corporation and Hercules Aerospace Company, both of Fairfax, Virginia, introduced to the aerospace industry their Pegasus Project: a satellite launch vehicle capable of introducing a maximum payload of 900 lbs to a maximum 250 mile high polar orbit (or

(continued)

COMM. NO. 548.01
Tax PG

... weight of orbital insertion) WITHOUT the necessity of a vertical launch platform and support personnel. Their satellite insertion vehicle was made to be launched from under the wing of a specially equipped 727, B-52 or other similar jet at an altitude of 40,000 feet. This development has made commercial satellite launching the province of any group with a long enough runway and the capital to invest in the necessary technology, without the necessity of an elaborate infrastructure and hordes of high-paid, high-tech personnel. Current Pegasus costs run around 25% of the vertical launch costs for satellite orbital insertions.

An even more powerful launch vehicle, the Pegasus IV is stated to be available in 1996.

2) EXISTING GLOBAL LAUNCH FACILITIES

The current centerpiece for commercial space launches is the French Ariane Space Launch Facility near Kourou, New Guinea. According to a recent issue of TIME magazine, "... ArianeSpace, the European Consortium, holds a commanding 50% share of the $1 billion launch market." In addition, recent western launch failures have boosted the competitive positions of China and Russia, which have state-supported space programs. China, in addition, charges approximately half of the $100 million that western firms get for a commercial launch.

There are currently 15 orbital space launch facilities available for commercial launches. Of those, the majority of "launches to date" (LTD) from 1957 thru 1986 have been handled by the Plesetsk (1111 LTD) and Baykonur (728 LTD) facilities in Russia (old USSR), and at Vandenburg AFB, CA (469 LTD) and Cape Canaveral, FL (371 LTD) in the United States. Of the remainder, Kapustin Yar, Russia (82 LTD) and Kourou, New Guinea (20 LTD) have launched the most commercial vehicles. Of the 20 commercial launches in 1992, fully half were serviced by the Kourou ArianeSpace facility. Existing launch sites around the globe have more than enough capacity to service the vertical space launch industry beyond the turn of the century.

* Concerning the environmental concerns of Hawai'i Islanders, there are equally great concerns regarding:

1) Ecological and Sociological Cultural Pollution
2) Economics

We will examine both arguments as follows:

1) ECOLOGICAL & SOCIOLOGICAL/CULTURAL POLLUTION

Aside from the obvious quoted statements of Dr. Robert Bowman at the beginning of this analysis regarding environmental impacts to the land, air and water, there are more subtle and insidious effects to be considered regarding the ecological, social and cultural evolution on the Island of Hawai'i. Large-scale developments rarely benefit the populations of any area in more than a peripheral way. The large monetary investments call for a rigid schedule of repayment such that the greater percentage of the profits of any development go off-island to pay off the original investors. Hawai'i Islanders can recall the experiences of the effects of the burgeoning hotel resort industry on their island economy. Job increases were more than offset by the rise in taxes and costs of living to the point that today the average islander has to work at least two jobs just to make ends meet. As a result, domestic violence and street crime has increased exponentially. The aloha spirit that is the backbone of attracting tourism to the islands has been diminished greatly in the frustration of simply ekeing out a living.

(continued)

A rocket launch facility would assuredly produce jobs, but the jobs would go only to those with the necessary security clearances for building the launch infrastructures (under federal regulations), and the necessary high-tech training as space launch personnel. The majority of these people would be imported to the island from elsewhere, just as the majority of construction personnel came from off-island to build the hotels. In a housing market that is already 5000 units short at present, new housing would NOT go to existing residents unless they could afford the further inflated costs.

On an island that imports fully 68% of it's foodstuffs, and nearly 100% of construction materials, shipping capacities would be further impacted with the additions of highly toxic chemicals and liquids. County taxes would have to go up again and again to cover the costs of increased infrastructure, both residential and commercial ... and these are PERMANENT costs.

2) ECONOMIC COSTS

Mauna Kea Volcano rises a majestic 13,784 feet above the surface of the ocean, and is by volume the largest mountain on Earth. The international astronomical community has chosen it's location as one of the premier viewing areas on Earth to study the heavens, and has invested heavily in both infrastructure and observatories to that end. Capital investment in the 13 telescopes on Mauna Kea, the most powerful in the world, will near the $1 billion mark by the year 2000. As conditions have degraded on other parts of the planet due to electronic interference, city light and industrial pollution, the Island of Hawai'i has become more and more the world center for solar observations. The operating budget for these observatories, currently at $10 million per annum, should increase to around $50 million yearly by the turn of the century.

The proposed rocket launch facility could cause serious problems for the astronomical community by negatively impacting viewing conditions via atmospheric light and exhaust pollution, and electronic interference. Astronomers are specifically concerned about radio frequency interference and the release of particulates and contaminants into the upper atmosphere.

In addition, the site of the preferred rocket launching site at Palima Point is but three miles from the most visited tourist destination on the Island of Hawai'i: Hawai'i Volcanoes National Park. Director Bryan Harry of the Nat'l Park Service's Pacific Area Office stated, "We can think of no more incongruous development adjoining a National Wilderness than an active spaceport. The National Park Service will seek every remedy possible, through the Congress or otherwise, to protect the integrity of the Ka'u Desert Nationally Designated Wilderness."

Spencer K. Schutte, Chairman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

August 22, 1993

Dear Chairman Schutte,

The property owners and residents of Green Sand subdivision wish to call to your attention the following list of our complaints against the Office of Space Industry (OSI).

We are particularly concerned at this time because the "briefing" by OSI scheduled for 8:30 a.m. on August 25th may not include an opportunity for public testimony. As is indicated in our lawsuit against DBEDT/OSI, they have not abided by State 'open meeting' laws and may prefer a "closed" session with the Council. However, because, as was so wisely pointed out by Councilperson Brian J. De Lima recently, keeping meetings open to the public is very important, I trust the County Council is making provision for concurrent public input on the spaceport DEIS.

To this end, I understand that Councilperson Jim Rath has offered to make arrangements for the well-recognized authority on the spaceport, Jay Hanson, to speak in order to provide a more balanced perspective.

I would appreciate your prompt response to this query. My fax number is 929-9244.

Thank you for your attention to this urgent matter.

Sincerely,

Sandra L. Demorueille
Project Coordinator
Informational Network for the Spaceport
- A Committee of Green Sand Community Association

PLEASE CIRCULATE WITH TESTIMONY TO FULL COUNCIL

COMM. NO. 548.04

12-141

TESTIMONY

infs
INFORMATIONAL NETWORK FOR THE SPACEPORT

TO: HAWAII COUNTY COUNCIL
August 22, 1993

INFORMATIONAL NETWORK FOR THE SPACEPORT
Complaints and Queries Against Office of Space Industry

1) CHRONIC DENIAL OF PUBLIC PARTICIPATION

The Office of Space Industry (OSI) has maintained undemocratic behaviors by holding closed meetings which denied even affected Ka'u property owners a right to attend and present testimony. Further, no public records were ever kept of these meetings.

This record of ignoring HRS 92 open meeting requirements does not bode well for the Hawaii Space Development Authority (HSDA), which is to be legislatively established as the well-insulated agency responsible for running the spaceport for the state. The proposed composition for this appointive body which is to serve as the only means of public input, the 'Citizen Advisory Committee', sounds much like the 'Space Advisory Committees' named in the Informational Network for the Spaceport (INFS) lawsuit. The spaceport DEIS states that "care should be taken to avoid committee membership to people whose positions are predictable (e.g., those who are members of special-interest groups)."

Will OSI continue to label "space opponents" as "special-interest groups" who will not be allowed on any HSDA boards?

2) CHANGES OF HAYWARD CONFLICT OF INTEREST: THE LOCKHEED CONNECTION

The prima facie evidence which includes an invoice from the Seoul Hilton depicting Hayward as "LOCKHEED,CONSULTANT TO PRESIDENT" indicates that a conflict of interest may exist. Robert McLaren, attorney for the Ethics Commission, has indicated that Hayward, as Chair of the Hawaii Space Development Authority (HSDA), falls under their jurisdiction and an inquiry is proceeding at this time.

Will the Hawaii County Council urge the legislature provide follow-up to this investigation?

3) FAULTY PROCUREMENT PRACTICES

Thousands of people have voiced their demand for a legislative inquiry into the procurement practices of OSI through petitions to Senator Richard Matsuura, chair of the Senate committee charged with investigating state purchasing activities. They base their demand on the fact that while 48 contracts totalling $4,861,097.70 are listed on the OSI Expenditure Reports from 1988 through fiscal 1992, apparently only the original State-Federal EIS contract awarded to CH2M Hill was done through a nationally advertised "bid" process as required by state law.

Were all the other contracts done as "sole-source" contracts, thus avoiding a free and open competitive selection process?

4) DENIAL OF CONSTITUTIONAL RIGHTS TO AFFECTED KA'U RESIDENTS

On the DEIS, Governor John Waihee is listed as the Accepting Authority for the state EIS after a Final EIS document is developed incorporating public comments generated during the comment period. On the KGMB Channel 9 (Honolulu) evening news of August 12, 1993, Governor Waihee stated that he was pleased with the EIS [which was sans public comments beyond those generated in 1989 during the scoping process] and that, on balance, more good than harm would come from this spaceport development.

The U.S. Constitution Amend. XIV states: "nor shall any state deprive any person of life, liberty or property, without due process of law." **The issue is: does Waihee's stated opinion create a sufficient threat to the fairness of the Acceptance decision to violate due process rights of the potentially affected Ka'u residents?**

The property owners of Green Sand subdivision argue that they have a Constitutional right to due process which is "concerned with both the appearance and the reality of fairness. Thus, if an administrator delivers a speech or issues a public statement which creates the impression that he has prejudged the facts of a pending matter, he must disqualify himself, even if he has an open mind in the case." Cinderella Career & Finishing Schools, Inc. v. FTC, 425 F.2d 583 (D.C.Cir. 1970) (Cinderella II) (Gellhorn and Boyer, Administrative Law and Process in a Nutshell, 2nd Ed., 1981)

Will the lot owners be forced to seek judicial relief because Waihee's televised statements reflect a prejudgment of the spaceport EIS before examining the public commentary, constituting a denial of their due process?

5) MISREPRESENTATION BY OSI

By expending untold sums on public relations consultants and lobbying firms, including Huber Finn/Frederick Sprayer in Washington DC, OSI has sought to manipulate the public and the media, yet a firm 65% of affected residents are opposed to the spaceport.

How much more tax money will be required to pay PR firms to "sell" this project?

6) "PROBLEMATIC" SPACEPORT DEIS

The spaceport DEIS filed with Office of Environmental Quality Control (OEQC) on August 10, 1993 does not meet Federal NEPA requirements. It merely purports to fulfill the STATE requirements (HRS 343) for an EIS.

This document was hastily released and represented a sudden change from the document contracted for through CH2M Hill and then Marilynn Metz which was to meet HRS 343 sec. 6 (f) requirements for a joint Federal-State EIS. This joint EIS had been 'scoped' through public meetings in the affected communities and a public comment period in September, October, and November of 1989.

On July 14, 1993, Jake Yoshihara of DBED] unilaterally requested revision of the Joint Lead Agency Agreement "to reflect our planned action... to proceed at this time with a State Environmental Impact Statement (EIS)" for the spaceport. He further states: "This decision is based on local considerations and issues that require timely release of a State EIS."

Thus, questions arise in our minds:

a. **What are the compelling "local considerations" and "issues" (cited above) that suddenly forced OSI to ignore HRS 343 6(f) requiring joint Federal-State EIS activity whenever possible?**

b. **While the political briefings of legislators, county council members, and such special-interest groups as the Chamber of Commerce or the union ha[illegible] been carefully arranged t[illegible] [illegible]resent the high p[illegible]," of the spaceport DEIS [illegible] he select go[illegible]nment decision makers, why have no PUBLIC meetings been scheduled to date?**

TESTIMONY: Complaint Against OSI
Hawaii County Council

DRAFT BRIEF Green Sand Community Association V.
The Honorable John Waihee, Governor of the State of Hawaii

RE: Deprivation of due process through chief administrator's actions

FACTS: The Ka'u "spaceport" Environmental Impact Statement (EIS) intended to meet HRS 343 requirements was filed with the Office of Environmental Quality Control on August 10, 1993. Governor John Waihee is listed as the Accepting Authority for this state EIS after a Final EIS document is developed incorporating public comments generated during the comment period. The scoping meetings held in October 1989 and the comment period provide the only meaningful opportunity for the public to be heard before the decision on EIS Acceptance is made, which, once accepted by the Governor, will enable the Office of Space Industry (OSI) to acquire land for the "spaceport", including use of condemnation, as is the stated intent of OSI. On the KGMB Channel 9 (Honolulu) evening news on August 12, 1993, Governor Waihee stated that he was pleased with the EIS [which was sans public comments beyond those generated in 1989 during the scoping process] and that, on balance, more good than harm would come from this spaceport development.

Residents and property owners in Green Sand Subdivision were concerned during the EIS scoping process when their residences and lots were depicted on the Environmental Assessment document as being within the "population control zone" where the Office of Space Industry intends to acquire property outright or through controlling utilization of the property by the owners. These property owners have been informed that the sole opportunity remaining to be heard related to Acceptance of the EIS is to participate during the Draft EIS commenting period.

RULE OF LAW: U.S. Constitution Amend. XIV - "nor shall any state deprive any person of life, liberty or property, without due process of law"

ISSUE: Does Waihee's stated opinion create a sufficient threat to the fairness of the Acceptance decision to violate due process rights of the potentially affected Ka'u residents?

APPLICATION: The property owners have a Constitutional right to due process which is "concerned with both the appearance and the reality of fairness. Thus, if an administrator delivers a speech or issues a public statement which creates the impression that he has prejudged the facts of a pending matter, he must disqualify himself, even if he has an open mind in the case." Cinderella Career & Finishing Schools, Inc. v. FTC, 425 F.2d 583 (D.C.Cir. 1970) (Cinderella II) (Gellhorn and Boyer, Administrative Law and Process in a Nutshell, 2nd Ed., 1981)

CONCLUSION: The plaintiffs seek judicial relief because Waihee's televised statements reflect a prejudgment of the spaceport EIS before examining the public commentary, constituting a denial of their due process.

12-143

HAWAI'I COUNTY CO.

AUGUST 24, 1993

RE: SPACE PORT PROPOSAL FOR PALIMA POINT HAWAI'I.

DEAR SIR:

MY NAME IS WILLIAM F. HACHMEISTER, EX-USMC. I HAVE GENERATED A PETITION ON THE ISLAND OF HAWAI'I OBJECTING TO SPACE NUCLEAR POWER SOURCES ON SPACE LAUNCH VEHICLES. THERE IS A CURRENT NEGATIVE PUBLIC RESPONSE CONCERNING A COMMERCIAL (PRIVATE) LAUNCH FACILITY. THE PUBLIC HAS NO VOTE IN THESE ISSUES. ENCLOSED ARE REPORTS THAT THE STATE HAS GENERATED, AND THOSE I HAVE AUTHORED WITH SUPPORTIVE DOCUMENTATION. MY BACKGROUND: IN 1986 I SPOKE THE TRUTH, (USING PROPER PROTOCOL) AND I BLEW THE WHISTLE ON TELEDYNE MICRO ELECTRONICS FOR FALSE TEST PRACTICES. IN 1989 I WAS PART OF THE SUIT TO HALT THE GALILEO SPACE PROBE.

THE PROPOSED LAUNCH SITE:

IS PART OF A CURRENTLY ACTIVE VOLCANO NAMED KILAUEA, THE PU'U O'O VENT HAS BEEN ERUPTING FOR YEARS. THE SITE IS WITHIN MINUTES OF INUNDATION BY LAVA FROM THE FAULT KNOWN AS THE GREAT CRACK. THE VOLCANO NAMED MAUNA LOA IS IMMANENT IN ITS ERUPTION PROCESS, SOMETIME IN THE NEXT FEW YEARS, AND THE RIM IS SET TO FLOW LAVA IN THE GENERAL DIRECTION OF THE LAUNCH FACILITY AND ROCKET PADS. THIS ENTIRE AREA IS ACTIVE WITH EARTHQUAKES, AND THE FUEL FARM IS NESTED ON TOP OF A FLOOD GULCH, AND IN A MAJOR FLOOD ZONE. THE TOWN NAMED PAHALA IS JUST A FEW MILES FROM THIS FACILITY, AND IS IN THE DANGER ZONE IN THE EVENT OF MAJOR CHEMICAL RELEASE, OR EXPLOSION. THERE ARE MANY OTHER CRITICAL POINTS OF HUMAN OVERSIGHT THAT NEED TO BE EXPLORED AND NATURAL ELEMENTS THAT NEED TO BE CONSIDERED AND ARE ALARMING IN RESPECT TO THIS LAUNCH SITE, AS THE ENCLOSED REPORTS ESTABLISH.

NUCLEAR MATERIAL OBJECTION:

I AM GENUINELY CONCERNED, AS MILLIONS OF AMERICANS ARE, WITH THE SAFETY AND HANDLING OF NUCLEAR MATERIAL. IN 1989 I JOINED THE CHRISTIC INSTITUTE, AS AN EXPERT WITNESS, IN A SUIT TO HALT THE SHUTTLE LAUNCH CARRYING THE NUCLEAR FUELED SPACE PROBE GALILEO. I GAVE TESTIMONY AGAINST TELEDYNE, MY EX-EMPLOYER FOR THEIR ONGOING FRAUDULENT MANUFACTURING POLICY OF FALSE TESTING THE CRITICAL COMPUTERS FOR BOTH MANNED/UNMANNED LAUNCH VEHICLES. BY 1989 TELEDYNE WAS KNOWN BY GOVERNMENT AGENCIES TO BE FILLED WITH 'LAYERS OF DECEIT'. THE PENTAGON AND JUSTICE DEPARTMENT WERE ACTIVELY INVOLVED IN INVESTIGATING TELEDYNE'S FRAUDULENT ACTIVITY AND THROUGH PLEAS OF GUILT BY TELEDYNE EMPLOYEES THERE WAS SUBSTANTIAL CONCRETE EVIDENCE THAT A SERIOUS PROBLEM EXISTED. IT WAS UNETHICAL FOR JUDGE GERSCH TO ALLOW THE LAUNCHING OF A SPACE SHUTTLE, CARRYING NUCLEAR MATERIAL, UNTIL IT WAS ABSOLUTELY CERTAIN TELEDYNE WAS NOT RISKING THE QUALITY ASSURANCE OF THEIR MANUFACTURED COMPUTERS FOR THE CONTESTED LAUNCH OF GALILEO.

COMM. NO. 548.05
Presented To: Council

TELEDYNE AND ETHICS:

FURTHER IT IS NOT WITHIN AMERICAN STANDARDS THAT TELEDYNE OPERATED IN CONTINUOUS FRAUD, WITHOUT FEAR OF PROSECUTION, AND WHEN DISCOVERED THEY WENT WITHOUT PROPER CHALLENGE. TELEDYNE'S STATEMENT THAT NO MISSILE OR LAUNCH VEHICLE FAILURE CAN BE CONTRIBUTED TO THEIR RESPONSIBILITY IS IN CHALLENGE BY THE NASA SHUTTLE CHALLENGER MALFUNCTION. I DID A STUDY OF THAT FAILURE AND FOUND DISCREPANCIES WITH THE FINDINGS OF THE ROGER'S COMMISSION, AND FOUND THAT THE GUIDANCE AND LIQUID HYDROGEN FAILED THE CHALLENGER AND NOT THE SOLID ROCKET BOOSTER (SRB).

THE CHALLENGER FAILURE HAS TO BE REVISITED BY FORMAL INVESTIGATION, AND WHAT RESPONSIBILITIES MARTIN MARIETTA "THE PRIME CONTRACTOR" AND TELEDYNE HAVE TOWARD THE CAUSE OF THE SHUTTLE FAILURE IN THE EVENT MY STUDY PROVES CORRECT.

CONTRACTORS CREATE DILEMMA FOR OUR NATION:

BEFORE WE AS A NATION CONTINUE WITH SPACE EXPLORATION USING NUCLEAR FUELS, AND OTHER DEVICES CAPABLE OF MASS DESTRUCTION I DEMAND WE PROPERLY BURY OUR DEAD BECAUSE OF PAST MALFUNCTIONS AND AN ABUSIVE UNREGULATED INDUSTRY; THE ASTRONAUTS AND ONE WHO WAS A CIVILIAN WHO DIED IN THE CHALLENGER, AND THOSE WHO DIED IN THE PERSIAN GULF WAR. REMEMBER, IT WAS TELEDYNE WHO ADMITTED FALSIFYING CRITICAL TESTS ON THE PATRIOT MISSILE DEFENSE SYSTEM. NOT FORGETTING THOSE IN THE INDUSTRY WHO WOULD NOT ACCEPT MEDIOCRITY: BILL MCGINNESS, WHO FOUGHT HARD TO CORRECT IMPROPER LAUNCH VEHICLE ASSEMBLY, AND WAS FOUND DEAD OF A GUN SHOT WOUND TO THE HEAD JUST A FEW WEEKS AFTER JUDGE GERSCH'S DECISION. WE MUST HAVE PERFECT METHODOLOGY IN ALL PHASES OF HANDLING NUCLEAR MATERIAL, AND NO FEAR OF UPSETTING DEFENSE CONTRACTORS.

I AM STRONGLY AGAINST THE USE OF NUCLEAR MATERIAL OF MASS QUANTITY IN THE UP-COMING PLANETARY INITIATIVE. SPACE NUCLEAR REACTORS ARE CAPABLE OF ADVERSE WORLDWIDE EFFECTS IN THE EVENT OF FAILURE, AND IT ONLY TAKES ONE FAILURE TO IRREVERSIBLY CHANGE THIS PLANET.

THIS IS THE DARKEST CORNER OF AMERICA'S SPACE INITIATIVE AND NO LEGAL ACTION WAS EVER PURSUED TO PROTECT MANKIND AND THE ENVIRONMENT OR TO CLEAR THE FAILURE OF THE NASA CHALLENGER. I DO NOT THINK THAT OUR GOVERNMENT IS OR WAS FULL OF FOOLS, BUT SOME IN OUR GOVERNMENT WERE FOOLED BY THOSE ENTRUSTED WITH THE MANUFACTURING OF ELECTRONIC DEVICES.

I HAVE THE GREATEST ADMIRATION FOR PRESIDENT CLINTON'S ADMINISTRATION.

SINCERELY,

WILLIAM F. HACHMEISTER

ENCLOSURES: REPORTS - On file in the Clerk's office

12-144

Spencer K. Schutte, Chairman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

August 26, 1993

Dear Chairman Schutte,

As I stated in my correspondence of August 22nd, the property owners and residents of Green Sand subdivision have a number of concerns about the manner in which Office of Space Industry has constantly excluded the public from providing input on the spaceport project.

The practice of holding agency board meetings without public notification, which Munechika admitted to under questioning from Mrs. Hale, is an example of why we were forced to sue OSI for compliance with HRS 92 "open meeting" requirements. Along with no notification and no allowance for public testimony, the boards failed to keep any minutes as public records of their meetings (see, e.g., correspondence from Munechika indicating "no minutes" were available for inspection).

To most people, the "Sunshine Laws" are very important. Please, in the future, and especially for the workshop on the spaceport DEIS, make provision for public testimony.

Thank you for your prompt consideration of this urgent concern.

Sincerely,

Sandra L. Demoruelle
Project Coordinator
Informational Network for the Spaceport
- A Committee of Green Sand Community Association
P.O. Box 588, Naalehu Hawaii 96772

PLEASE CIRCULATE TO FULL COUNCIL

COMM. NO. 548.0

MAZZARINO & ASSOCIATES
4930 Concord Rd. Sacramento, CA. 95820

ERMINO MAZZARINO C.E.
DELANA PHILLIPS-MAZZARINO M.D.
4930 CONCORD ROAD
SACRAMENTO, CA 95820

CHAIRMAN
SPENCER K. SCHUTTE
25 ALPUNI STREET
HILO, HI 98720

AUGUST 23, 1993

RE: PALIMA POINT SPACEPORT

DEAR CHAIRMAN SCHUTTE:

MY FAMILY AND I HAVE RECENTLY PURCHASED A 20 ACRE PARCEL ON THE ISLAND OF HAWAI'I AND IN THE DISTRICT OF KA'U. OUR PLANS ARE TO MOVE TO THE ISLAND IN NOVEMBER OF THIS YEAR. I WILL FARM THE LAND AND DELANA WILL PRACTICE MEDICINE WITH THE PAHALA MEDICAL CLINIC. THE REASONS I AM WRITING THIS LETTER IS THAT I HAVE GREAT CONCERNS WITH THE SAFETY AND ENVIRONMENTAL ISSUES OF THE PROPOSED SPACEPORT. WE HAVE BEEN FOLLOWING THE PROGRESS OF THE PROPOSED SPACEPORT THROUGH NEWSPAPER ARTICLES AND EDITORIAL. I FIND IT DIFFICULT TO BELIEVE THAT YOU WOULD SUPPORT SUCH A DANGEROUS AND UNPOPULAR UNDERTAKING.

PLEASE ALLOW ME A FEW MINUTES OF YOUR TIME TO EXPLAIN MY FEELINGS AND CONCERNS OVER THE SPACEPORT.

1. THERE HAVE BEEN PETITIONS CIRCULATED AND SIGNED BY NEARLY EVERY RESIDENT OF THE KA'U DISTRICT. THEIR CONCERNS HAVE BEEN VOICED OVER LOCAL TELEVISION STATIONS. WHY ARE THE ELECTED OFFICIALS NOT LISTENING TO THE VOICE OF THE PEOPLE? ALL THE EVIDENCE CLEARLY SHOWS THAT THE BIG ISLAND DOES NOT WANT THE SPACEPORT.

2. THE LOCAL ENVIRONMENT WOULD HAVE A NEGATIVE IMPACT THAT WOULD ALTER THE FACE OF THE MOST UNIQUE AND BEAUTIFUL DESERT IN THE WORLD. HUNDREDS OF ACRES OF SENSITIVE ECOLOGICAL AREAS WOULD BE DEFACED. THIS PRISTINE LAND WOULD BE REPLACED WITH LARGE FUEL TANKS, STORAGE FACILITIES, CHAIN LINK FENCES/WITH GUARDS AND TOWERS.

3. THE ROADS TO THE PALIMA POINT AREA FROM HILO AND KONA WOULD UNDERGO SEVER CHANGES FORM THE HEAVY EQUIPMENT REQUIRED TO TRANSPORT THE GIGANTIC MACHINES NECESSARY TO CONSTRUCT THE SPACEPORT. TRAFFIC ON THE ONLY HIGHWAY WOULD BE DELAYED FOR HOURS IN BOTH DIRECTION FOR SEVERAL YEARS. THEN BEGINS THE WORK OF REPLACING THE DESTROYED ROADS. THAT WOULD DELAY TRAFFIC AGAIN. THE MONIES FOR THE REPAIRS WOULD BE THE BURDEN OF THE STATE. THE STATE WOULD PURCHASE THE LAND AS WELL. THESE CONCESSION ARE GIVEN TO CONTRACTORS AS AN INCENTIVE FOR THE BIDDING CONTRACTORS. IT APPEARS THAT THE STATE WANTS TO PURCHASE ITSELF A JOB.

PAGE 1 OF 4
COMM. NO. 5146
Presented To: PG

Tel: 916 383-6756 CONSTRUCTION CONSULTANT FAX 916 387-8716

INFORMATION SENT TO SANDRA DEWORUELLE

105	Report on research re: Royal Peahy land plan	6/19/91		Restricted information as determined by OIP
106	Script and video tape for production [help WS provided to JC]	6/19/91		Restricted information as determined by OIP
107	Minutes and correspondence of Kau regional Advisory Board	6/19/91	10/14/91	No minutes, correspondence sent
108	Minutes and correspondence of Hilo Advisory Board	6/19/91	10/14/91	No minutes, correspondence sent
109	Minutes and correspondence of Kona Advisory Board	6/19/91		No minutes
110	Min. and corr. of overall Advisory Committee meeting	6/19/91		(meeting at Bratione 1/18/90) no minutes
111	Min. and corr. of the Hawaii Island Economic Development Board	6/19/91		No minutes
112	Conflict of interest forms from OSHHSDA persons	6/27/91		none exist
113	MCM outline of topics for the EIS	6/27/91	8/7/91	Sent
114	MCM chart w/ sequence of activities and times for completion	6/27/91		Working document as determined by OIP
115	Harvey Meyrson contract #30704	7/12/91	10/14/91	Sent
116	Request for Gov. authorization	7/12/91	10/14/91	Sent
117	Letter of approval from Gov.	7/12/91	10/14/91	Sent
118	Invoices for 30704 Jan 91 - Sept 91	7/12/91	10/14/91	Sent
119	U. of Hawaii contract# 30451	7/12/91	10/14/91	Sent
120	Request for authorization for 30451	7/12/91	10/14/91	Sent
121	Letter of Approval from Gov. for 30451	7/12/91	10/14/91	Sent
122	Invoices for 30451 July 91 - Aug 91	7/12/91	10/14/91	Sent
123	Bruce Benson Marketing contract # 28842	7/12/91	10/14/91	Sent
124	Request for Authorization for 28842	7/12/91	10/14/91	Sent
125	letter of Approval from Gov. for 28842	7/12/91	10/14/91	Sent
126	Invoices for 28842 Aug 90 - Sept 90	7/12/91	10/14/91	Sent
127	Arthur D. Little contract # 25533	7/12/91	10/14/91	Sent
128	Request for Authorization for 25533	7/12/91	10/14/91	Sent
129	Letter of Approval from Gov. for 25533	7/12/91	10/14/91	Sent
130	Invoices for 25533 Mar 88 - Jan 88 & Aug 88 & Dec 88	7/12/91	10/14/91	Sent

4. THE NEAREST MEDICAL FACILITY TO THE SPACEPORT IS THE PAHALA CLINIC. IT IS A SMALL CLINIC WITH TWO EMERGENCY BEDS AND TWO DOCTORS. THE HOSPITAL HAS ONLY 15 "NURSING HOME" BEDS. THE AREA WOULD REQUIRE FAR MORE MEDICAL SUPPORT AND FACILITIES TO ACCOMMODATE FOR CHEMICAL EMERGENCIES. THE HOSPITAL WOULD REQUIRE NEW CONSTRUCTION FOR CHEMICAL DECONTAMINATION. WHO WOULD PAY FOR THE EXTRA SUPPORT AND EXPANSION OF THE MEDICAL FACILITIES, THE STATE?

5. THE HEALTH RISKS HAS NOT BEEN ADDRESSED BY THE STATE, DEIS, DBEDT, SPACEPORT MANAGEMENT OR CONTRACTORS. WHO WOULD CARRY THE BURDEN FOR ACCIDENTS. WHO WOULD INSURE THE SPACEPORT?

IT IS EVIDENT THAT PAHALA IS IN EXTREME DANGER OF HIGHLY TOXIC CHEMICAL SPILLS SUCH AS NITROGEN TETROXIDE AND HYDRAZINES FROM THE SPACEPORT. HILO IS AT HIGH RISK FROM TRANSPORTATION SPILLS. THE RESPONDE TIME NEEDED TO INSURE THE SAFETY OF LIVES WOULD NOT BE SUFFICIENT, DUE TO THE ROADS AND WEATHER CONDITIONS. A SPILL IN THE CITY OF HILO WOULD TO DEVASTATING. THE PERSONNEL ASSIGNED WITH THE CONVOY, TO ASSIST WITH TRANSPORTATION SPILLS AND THE EVACUATION OF THE PUBLIC WOULD BE OVERCOME BY THE TOXIC FUMES PRIOR TO DONNING THE CHEMICAL SUITS. AT THAT POINT THEY WOULD BECOME A VICTIM AND UNABLE TO ASSIST WITH THE EVACUATION OR CLEANUP.

OTHER HEALTH RISKS THAT HAVE NOT BEEN ADDRESSED ARE LAUNCH FAILURE. MY UNDERSTANDING IS THAT ABOUT 5-10% OF THE LAUNCHES ARE ABORTED OR FAILURES. OF THE PROPOSED 10 LAUNCHES ANNUALLY, 1 WOULD FAIL. THAT IS NOT A GOOD PERCENTAGE.

THE BLAST AND BOOM RISK FROM SUPER SONIC BOOMS WOULD BE HEARD IN HILO AND KONA. THE BLAST FROM A ROCKET FALLBACK SHORTLY AFTER LIFTOFF WOULD SURLY BREAK WINDOWS IN PAHALA AND SURROUNDING AREAS. ASSOCIATED WITH THIS WOULD BE LACERATIONS FROM BROKEN GLASS AND BONE INJURIES FROM FALLS.

6. THE PROPOSED SITE IS SITUATED IN THE LAVA ZONE #1. LAVA FLOW SHOULD ANOTHER ERUPTION OCCUR, WOULD BE IMMINENT IN THAT AREA. SEVERAL OF THE CHEMICALS WHICH WOULD BE STORED ON SITE ARE HYPERGOLIC PROPELLANTS, WHICH IGNITE SPONTANEOUSLY WHEN MIXED WITH COMPLEMENTARY FUEL. LIQUID HYDROGEN IGNITES WHEN IT COMES INTO CONTACT WITH AIR. WHY WOULD ANYONE STORE SUCH HIGHLY VOLATILE CHEMICALS IN THE PATH OF A LAVA FLOW!

THE LAST MAJOR EARTHQUAKE IN THE KA'U REGION WAS IN 1868 IT MEASURED 7.5-8 POINTS ON THE RICHTER SCALE. IT IS GENERALLY CONSIDERED A VERY POOR RISK TO CONSTRUCT BUILDINGS ON A EARTHQUAKE FAULT ZONE. TO CONSTRUCT A VOLATILE CHEMICAL FACILITY ON A EARTHQUAKE FAULT ZONE IN UNCONSCIONABLE.

7. RECENTLY ARTICLES OF CONFLICT OF INTEREST HAVE BEEN APPEARING IN THE NEWSPAPERS. I AM REFERRING TO ADMIRAL THOMAS B. HAYWORD' CONTRACT WITH THE STATE OF HAWAI'I AS A SPACEPORT CONSULTANT. HE IS ALSO UNDER CONTRACT AS A CONSULTANT TO PRIME CONTRACTORS FOR THE SPACEPORT, SUCH AS LOCKHEED, UNITED TECHNOLOGIES, MORRISON-KNUDSEN GENERAL DYNAMICS AND MILITARY AFFAIRS COUNCIL OF THE HAWAI' CHAMBER OF COMMERCE. WITH SO MANY INTEREST IT WOULD BE MOST DIFFICULT NOT TO HAVE CONFLICT OF INTEREST NOT ONLY WITH STATE AND PRIME CONTRACTORS, BUT ALSO BETWEEN THE PRIME CONTRACTORS.

IT IS DISTURBING FOR ME TO HEAR ELECTED OFFICIALS LIKE HONOLULU'S MAYOR, MR. FRANK FASI, IN A MEETING WITH THE HAWAI'I ISLAND CHAMBER OF COMMERCE IN JUNE, SAY: "THAT THE 120,000 RESIDENTS OF THE ISLAND SHOULD NOT BE THE ONES TO DECIDE WHAT IS BEST FOR THE ENTIRE STATE WHEN IT COMES TO A DECISION ON THE SPACEPORT."

8. THE REVENUE TO THE COUNTY FROM THE SPACEPORT WOULD BENEFIT BY 4.2 MILLION EACH YEAR. A TOTAL STATE AND COUNTY TAX REVENUES OF 10.7 MILLION ANNUALLY. JOB BASE WOULD INCREASE BY 250 IN KA'U AND 120 IN HILO.

STOPING THE SUBSIDY TO THE SUGAR COMPANIES ALONE WOULD SAVE THE STATE 10 MILLION.

THE PROBLEMS THE SPACEPORT WILL CREATE TO THE INFRASTRUCTURE, TOURISM INDUSTRY, FISHING INDUSTRY, MEDICAL FACILITIES, HEALTH RISKS FROM NOISE, SPILLS AND BLASTS, WATER CONTAMINATION, DISTURBED WILDERNESS AND TO THE 120,000 RESIDENCE OF THE GENERAL AREA THAT WOULD BE ADVERSELY EFFECTED BY THE SPACEPORT, WOULD COST THE STATE FAR MORE THAN THE ESTIMATED $10.7 MILLION REVENUE IT PLANS TO REALIZE FROM THE CONSTRUCTION AND FULL OPERATION OF THE SPACEPORT. THE STATE WOULD NEED TO FORM COMMITTEES TO SAFEGUARD THE INTEREST OF THE PEOPLE AND OVERSEE THE OPERATION OF THE SPACEPORT. ADMINISTRATION SERVICES WOULD NEED TO BE ESTABLISHED TO HANDLE THE HUGE VOLUME OF DATA SUCH A PROJECT WOULD ENTAIL. TO ESTABLISH AN ADMINISTRATION TO CONDUCT THE DAILY TRANSACTIONS OF THE SPACEPORT WOULD COST THE STATE AND COUNTY HUNDREDS OF THOUSANDS OF DOLLARS OR MILLIONS OF DOLLARS ANNUALLY. ADD THE PURCHASE OF THE LAND TO THE GENERAL COST OF THE PROJECT. I DO NOT HAVE ALL THE EXPENSES FOR THE PROPOSED SPACEPORT TO HELP CALCULATE THE RATE OF RETURN FOR DOLLARS SPENT, BUT I WOULD BE WILLING TO BET THAT THE PAYBACK WOULD BE IN TERMS OF 20 OR MORE YEARS. AND FAR DIMINISHED FROM THE $10.7 MILLION EXPECTED TAX REVENUES.

IT HAS BEEN CITED THAT ONE OF THE MAJOR REASONS FOR THE SPACEPORT LOCATION IN THE KA'U DISTRICT IS TO HELP BOLSTER THE SLIDING ECONOMY OF THE AGRICULTURAL BASED KA'U DISTRICT. WHY NOT USE A PORTION OF THE ESTIMATED $420 MILLION COST TO CONSTRUCT AND EQUIP THE SPACEPORT TO EXPAND AND HELP THE MAIN SOURCE OF INCOME IN THE AREA. AGRICULTURE AND TOURISM? THERE ARE TWO COMPANIES THAT ARE IN NEED OF CASH TO HELP FINISH BEAUTIFUL RESORTS. WITH THE CLOSING OF THE SUGAR COMPANIES, THE RICH LAND REQUIRED TO GROW SUGAR COULD EASILY BE PUT TO USE TO GROW AN INCREDIBLE ARRAY OF FRESH FRUITS AND VEGETABLES. ENOUGH FOOD COULD BE GROWN IN THE KA'U DISTRICT TO FEED THE ENTIRE STATE.

PRESENTLY THE SUGAR COMPANIES ARE A BURDEN TO THE STATE THROUGH THE SUBSIDY PROGRAMS, AND THEY PAY LITTLE TAXES. RESEND THE VAST LAND HOLDINGS HELD BY THE SUGAR COMPANIES AND SELL THE PROPERTY TO THE HIGHEST BIDDER WITH A CLAUSE THAT THE LAND IS TO REMAIN AGRICULTURAL AND USED FOR AGRICULTURAL OR LIGHT RANCHING. THE PROCEEDS FROM THE LAND SALE AND NEW TAX BASE REVENUES WOULD FAR EXCEED THE $10.7 MILLION ESTIMATED REVENUES FROM THE SPACEPORT.

DEVELOPING THE AGRICULTURAL BASE IN THE KA'U DISTRICT WOULD NOT ONLY ASSIST IN THE PROMOTION OF JOBS. IT WOULD CREATE A LABOR FORCE IN AN AREA THAT NEEDS LABORERS. IT WOULD STABILIZE AND LOWER THE COST OF FOOD FOR THE ENTIRE STATE. IN CERTAIN AREAS OF THE KA'U DISTRICTS LOW CHILL FRUITS WOULD AND DO GROW, MAKING FRESH FRUITS AVAILABLE TO THE ENTIRE STATE THAT IS PRESENTLY SHIPPED IN. ALL THIS COULD BE ACCOMPLISHED WITH VERY LITTLE EFFORT, EXPENSE AND ABSOLUTELY NO HEALTH RISK TO THE PUBLIC.

THANK YOU VERY MUCH FOR YOUR ATTENTION CONCERNING THIS VERY IMPORTANT MATTER. I FEEL CONFIDENT THAT ONCE YOU REVIEW THE MATERIAL AND REPORTS FOR THE SPACEPORT YOU WILL FEEL AS STRONGLY AS I DO. THE SPACEPORT IS ENVIRONMENTALLY DAMAGING, DANGEROUS, AND AN EXPENSIVE UNDERTAKING THAT OFFERS VERY LITTLE IN RETURN.

SHOULD THESE ARGUMENTS NOT BE ENOUGH TO ALARM YOU AS TO THE SEVERITY OF THE SITUATION. REVIEW THE KENNEDY SPACE CENTER OR EDWARDS AIR FORCE BASE.

IN SACRAMENTO, CALIFORNIA OF THE TWO AIR FORCE BASES THAT WERE SCHEDULED FOR CLOSING. MATHER AIR FORCE BASE IS GOING TO COST THE STATE MILLIONS OF TAX DOLLARS FOR CHEMICAL ABATEMENT. Mc CLELLAN AIR FORCE BASE IS SO CHEMICALLY POLLUTED, THAT THE STATE CAN NOT AFFORD TO CLOSE THE BASE. IS THIS THE FUTURE YOU SEE FOR HAWAI'I.

SINCERELY,

Ermino Mazzarino

ERMINO MAZZARINO C.E.
DELANA PHILLIPS-MAZZARINO M.D.

12-147

Hawaii Island
Chamber of Commerce

Established in 1897 • 180 Kinoole St. Suite 118 • Hilo, Hawaii 96720 • Phone (808) 935-7178

September 2, 1993

Honorable Councilman Kalani Schutte
Chairman
Hawaii County Council
Hilo, Hawaii 96720

Dear Councilman Kalani Schutte and Council Members:

My name is Lani Kahawaii and I come before you today in my capacity as the President of the Hawaii Island Chamber of Commerce to comment on Resolution numbers 93-93 and 102-93.

As usual, the Hawaii Island Chamber of Commerce is supportive of new business and technology which can improve the business climate not only in Hilo and the Big Island but the entire state. After all, that is what Chamber of Commerce's are all about. It follows that if our Island economy is healthy, then our residents have an opportunity to live happy, healthy and economically successful lives.

Now comes before us an opportunity to expand our economic base with a new industry. A commercial satellite launching facility. It sounds formidable, like something from Star Trek. But it also sounds like we are entering the 21st century.

I know I need not remind the Council about the demise of sugar and the uncertainty of tourism in a growing world economy, all vying for the same tourist dollar. It is long past the time to look to the future and to develop new emerging industries and technologies.

The commercial satellite launching facility may not be the answer for our county or state. But don't you feel that we, and I mean all of us, should explore every possibility? The state has spent millions of dollars for the environmental impact statement. And before most of us has even had a chance to read over that study, this council considers not one, but two resolutions to end all discussion-to not consider, not study, not debate, not learn, and not talk.

COMM. NO. 548.(
Presented To: PC

Affiliated with the Chamber of Commerce of the United States

Any person that owns or manages a business knows that such rash decisions are not prudent. One must weigh the pros & cons and then make an informed, unemotional decision about what is best for the economy, the people, the future.

Just think about the airplanes that fly over portions of Hilo nearly 50 times a day. This is as common an occurrence as getting into our cars and driving. The possibility for disaster is conceivable, yet we have unconsciously weighed the pros and cons and decided that it is a risk worth taking. Hundreds of cities have done the same thing. Yet if jet plane landings in Hilo were a new issue today, the same people who object to anything new would be telling us that it would threaten our life style, culture and environment.

The Hawaii Island Chamber of Commerce asks this distinguished body to hear all the facts, sift through what is real and what is conjecture and then after digesting ALL the data make an informed decision for the future of the Big Island and the State of Hawaii.

We ask that you not pass out of committee Resolution numbers 93-93 and 102-93.

Thank you for giving us the opportunity to provide input.

Sincerely,

Lani Kahawaii

Lani Kahawaii
President

12-148

SEPTEMBER 4, 1993

HAWAI'I COUNTY COUNCIL

RE: SUPPLEMENTAL TO MY REPORTS ON THE PALIMA POINT SPACEPORT.

DEAR COUNTY COUNCIL:

PLEASE INCLUDE THE ENCLOSED PAGES FROM THE MAGAZINE POPULAR SCIENCE, NOV. 1991. THESE ENCLOSURES CLEARLY DETAIL THAT THE DELTA CLIPPER CAN BE CONFIGURED AS A THERMIONIC LAUNCH VEHICLE. THIS SIZE ROCKET CAN BE LAUNCHED FROM HAWAI'I SINCE IT IS OF THE DELTA CLASS.

SINCERELY,

William F. Hachmeister

WILLIAM F. HACHMEISTER

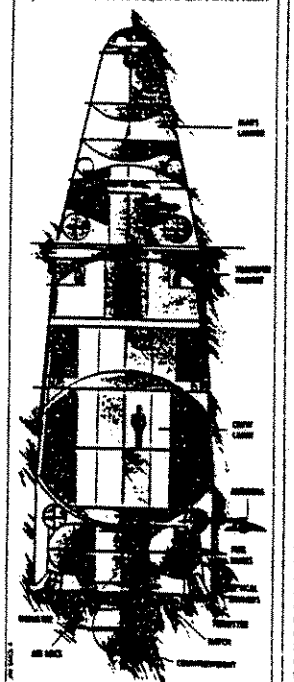
543.06

Presented

the $400 billion to $540 billion in costs projected by NASA.

The Bush administration has set a 2019 deadline for a manned Mars landing—the 50th anniversary of the moon landing—and the National Space Council, led by Vice President Quayle, is reviewing several proposals ("Mars on $350,000 a Day," March). The Soviet-Stanford plan would beat the deadline by seven years, but Quayle's group opposes a joint mission with the Soviets, proposed by Soviet President Mikhail Gorbachev in 1987. NASA also opposes a joint project.

Unlike other Mars-exploration proposals, the Soviet-Stanford plan doesn't rely on nuclear-powered rockets, which have not yet been developed. Nor does it require an American



A Soviet rocket would lift this 60-foot ship into space for a nine-month trip to Mars. Carrying a crew of six, the ship would spin around a 5-foot counterweight to create artificial gravity.

UNNATURAL CATASTROPHES

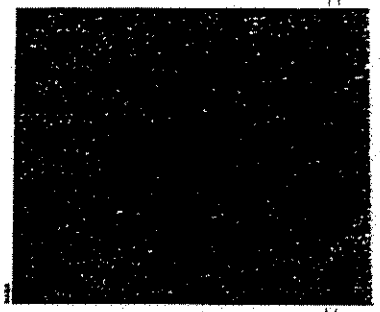
A quarter of a billion years ago, between the Permian and the Triassic periods, as many as 95 percent of all animal species on Earth—more than half of all marine families and most groups of mammal-like reptiles—perished. It was the greatest mass extinction known and a source of endless speculation as to its cause.

Now two scientists have shown that massive volcanic activity in Siberia occurred at precisely the right time to have accounted for the Permian-Triassic extinction. Paul R. Renne of the Institute of Human Origins in Berkeley, Calif., and Asish R. Basu of the University of Rochester in New York have succeeded in placing the volcanism of the Siberian Traps, located east of the Ural Mountains in the Soviet Union, at 248.3 million to 247.5 million years ago, using argon-argon radioisotope dating.

"This eruption occurred over an extremely short period of time, geologically speaking," says Renne. "We believe we've nailed the date down fairly precisely. It's even conceivable that it occurred over an interval as short as 200,000 years."

Paleontologists have suggested various mechanisms by which basaltic volcanic eruptions could have wiped out life forms. Untold tons of sediment and ash that spewed into the atmosphere could have cloaked Earth in a perpetual dust cloud, blocking sunlight, stifling photosynthesis, and collapsing food chains. On the other hand, massive amounts of carbon dioxide released by the volcanoes could have greatly increased greenhouse warming, raising temperatures on Earth too hot to support many kinds of creatures.

Another extinction, almost as devastating, occurred more recently—about 65 million years ago. Its cause has also been debated, but the leanest candidate is not volcanic activity but the impact of a giant asteroid or comet. Some experts still question how such a blow could have wiped out many different life forms—including the dinosaurs—over a long time period. But the physical evidence is now overwhelming that a large body, perhaps five miles across, did indeed roar down onto Earth approximately 65 million years ago; there are strong indications that the site of this catastrophic collision was off the northern coast of the Yucatan Peninsula in Mexico. Satellite images show a 125-mile-diameter ring of cenotes, or water-filled sinkholes, that may mark the rim of a crater created by the impact. Apart from the huge fireball, tidal waves, and earthquakes that would have resulted, the hammer blow would have created a globe-girdling, long-lasting



Water-filled sinkholes in the northern Yucatán Peninsula, averaging 300 to 500 feet in diameter, may mark the rim of a crater left by a meteorite 65 million years ago.

shroud of debris particles, turning off photosynthesis—and life.

Could such a body strike Earth in the future with similarly dire results? In July, NASA gathered a panel of 23 space scientists to discuss the possibility—and the means to avoid it—in the first International Conference on Near-Earth Asteroids. The panel estimated that some 10,000 asteroids, ranging up to three miles in diameter, sometimes orbit close enough to Earth to strike it, but that only one percent of them have been tracked to date. If one of these collided with Earth, the panel reported, the force of the impact would equal that of the explosion of 1,000 to 10 million tons of TNT, "leading to the deaths of hundreds of millions and perhaps billions of people."

The panel called for the construction of a number of large telescopes designed specifically to seek out and plot the trajectories of most Earth-crossing asteroids within the next 25 years, to learn if any of them could pose a threat within the next few centuries. Steve Osiro, a panel member from NASA's Jet Propulsion Laboratory in Pasadena, Calif., called for further studies of how an asteroid on a collision course with Earth might be shunted aside.

Past proposals have included blasting the asteroid with a rocket-borne nuclear warhead. A panel member, astronomer Joseph Veverka of Cornell University, scorned such a plan as "science fiction."

One of the most startling asteroid impact theories comes from scientists at NASA's Ames Research Center in Moffett Field, Calif. Based on the lunar craters seen during the Apollo missions, they conclude that all life on Earth may have been snuffed out at least twice in the planet's first billion years by very rare, planet-melting super-impacts—collisions with bodies as big as California. Thus life may have begun more than once. —*Arthur Fisher*

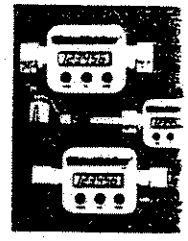
WHAT'S NEW

DISC WIZARD

Load up to five compact discs on the Pioneer CLD-M90's slide-out tray and a mechanical arm shifts selected discs from the tray one to the center for playback. The $700 machine also plays a videodisc that is placed on top of the CDs, displaying its playback and programming status on your TV screen. A new feature offers one-second "sound bites" during fast scans of videodiscs.

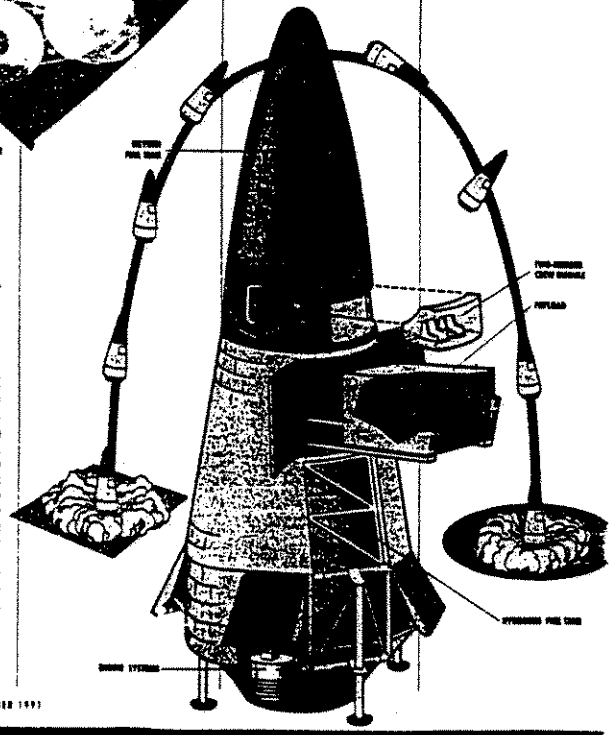
WASTE NOT WATER

The $35 Waterwatcher connects to a water pipe that supplies your dishwasher or shower to measure water usage in gallons, liters, or cubic feet. A $40 version attaches to your garden hose, or a $60 version can be plumber-installed on the water main. The unit's display provides monthly comparisons. Waterwatcher, 1219 Morningside Dr., Suite 50, Manhattan Beach CA 90266.



FAST TRACK TO SPACE

This Single-Stage-to-Orbit (SSTO) vehicle could fill the technology gap in Earth-to-orbit transportation. Using off-the-shelf components, the oxygen-carrying rocket could be less expensive and take less time to ready for flight than the space shuttle, and may fly years before the air-breathing National Aerospace Plane ("X-30," this issue). Sponsored by the Strategic Defense Initiative Organization, the reusable rocket is intended for commercial and military missions up to 14 days long, either with a two-man crew or guided remotely. It would take off and land vertically. A test flight is scheduled for 1993.



12-150

September 7, 1993

Hawaii County Council
Hilo, Hawaii

RE: STATEMENT OF THE ILWU LOCAL 142 ON RESOLUTION NO. 93-93 and NO. 102-93

Honorable Council Members:

My name is Russel Botelho, Sr. and I am speaking on behalf of the ILWU Local 142, which represents 28,000 workers statewide, some 6,000 of whom are on this island and 400 of whom live in Ka'u.

The ILWU opposes Resolution No. 93-93 and Resolution No. 102-93, both of which seek to have the County Council oppose construction of a rocket launch facility in the Ka'u District and calls on the State to abandon any further efforts to support the creation of such a facility. We believe these measures are premature because a final environmental impact statement on the facility has not yet been completed.

Opinions have been rendered, pro and con, about the impact that a spaceport would have on the community and the environment. However, we believe that all of the information necessary to make a decision is not yet available. We prefer to wait and review the information that will be derived through the final EIS before passing judgment on the project.

Like many others, we are concerned about the economy on the Big Island. So many jobs are being lost in the sugar industry, and less than desired hotel occupancy has reduced work hours for many of our members in the tourist industry. The spaceport project raises the possibility of new and needed jobs in an area of the island that may, if Ka'u Sugar goes the way of the other two plantations here, become economically depressed.

However, the ILWU also believes that a final decision on whether the spaceport will benefit more than it will harm really should come after all studies are completed. We don't want to end up with a spaceport that will later prove to be harmful to our environment and our community. On the other hand, we don't want to prematurely stop further activity on a project that may prove to be of direct benefit to our economy and improve the quality of life for those in the Ka'u District. Too much money has been invested on the EIS that we can ill afford to ignore it entirely.

We hope the County Council will agree and will shelve Resolution No. 93-93 and Resolution No. 102-93. Thank you for allowing the ILWU to share our views and concerns.

COMM. NO. 548.10
Presented To: PC

JOHN WAIHEE
MUFI HANNEMANN
BARBARA KIM STANTON
RICK EGGED
TAKESHI YOSHIHARA

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King St. 11th Floor Honolulu, Hawaii
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2355 Fax (808) 586-2482
Hawaii Island Office Hawaii Business Center 50 Auburn Street Suite 212 Hilo, Hawaii 96720 Telephone (808) 933-4600 Fax (808) 933-4602

September 7, 1993

Hon. Takashi Domingo, Chairman,
and Members of the Hawaii
County Council Planning Committee

RE: **RESOLUTIONS 93-93 AND 102-93**

I AM STEVE TODD, AN ECONOMIC DEVELOPMENT SPECIALIST ATTACHED TO THE HAWAII ISLAND OFFICE OF THE STATE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM. I APPRECIATE THIS OPPORTUNITY TO COMMENT ON RESOLUTIONS 93 AND 102. THE PROPOSED COMMERCIAL SATELLITE-LAUNCHING FACILITY IS A DBEDT INITIATIVE, AND THE DEPARTMENT HAS VERY SERIOUS CONCERNS ABOUT THE CONTENT--AND ESPECIALLY THE TIMING--OF BOTH RESOLUTIONS.

FIRST, AS A FOUNDATION FOR TODAY'S DISCUSSION, WE SHOULD CONSIDER HOW WE HAVE ARRIVED AT THIS POINT:

THE 21ST CENTURY IS LESS THAN SEVEN YEARS AWAY. LIKE ANY NEW CENTURY, IT WILL BRING WITH IT SOME CHALLENGES AND OPPORTUNITIES THAT WE CAN'T EVEN BEGIN TO IMAGINE. WHILE NO ONE HAS A CRYSTAL BALL THAT CAN PREDICT THE FUTURE, PLANNING FOR THE FUTURE IS ONE OF THE HIGHEST PRIORITIES OF HAWAII STATE GOVERNMENT. THE STATE IS CONTINUOUSLY PLANNING IN TERMS OF LAND USE, HOUSING, EDUCATION, HEALTH CARE, EMPLOYMENT AND MANY OTHER AREAS. CERTAINLY, ONE OF THE MOST VITAL OF THESE IS ECONOMIC DEVELOPMENT. WITHOUT ECONOMIC DEVELOPMENT, IT IS EXTREMELY DIFFICULT TO DO THE OTHER THINGS...OR TO PROVIDE FOR THE NEEDS OF OURSELVES, OUR FAMILIES AND OUR COMMUNITIES.

COMM. NO. 548.12
Presented To: PC

AS THE STATE LOOKS AT HAWAII'S ECONOMIC FUTURE, THERE IS CAUSE FOR CONCERN. FOR DECADES, WE HAVE BEEN OVERLY DEPENDENT UPON JUST A FEW INDUSTRIES--TOURISM, AGRICULTURE (ESPECIALLY SUGAR AND PINEAPPLE), AND SPENDING BY THE FEDERAL GOVERNMENT (IN PARTICULAR, MILITARY SPENDING). WE DON'T NEED A CRYSTAL BALL TO SEE THAT THESE INDUSTRIES CANNOT CONTINUE TO SUPPORT OUR ECONOMY TO THE SAME EXTENT AS THEY HAVE IN THE PAST.

CLEARLY, WE MUST DO WHAT WE CAN TO SUPPORT EXISTING INDUSTRIES AND TO ENCOURAGE NEW ONES. WHILE WE COULD COMPILE A "WISH LIST" OF WHAT THESE NEW ENTERPRISES MIGHT BE, WE ALSO MUST BE REALISTIC; REALISTIC ABOUT WHAT THEY CAN DO FOR US AND WHAT WE CAN DO FOR THEM. THE ITEMS ON OUR "WISH LIST" MUST MAKE GOOD, SOUND BUSINESS SENSE. JUST LIKE TOURISM, AGRICULTURE AND THE MILITARY, NEW INDUSTRIES MUST SEE A PRACTICAL ADVANTAGE--NOT JUST AN AESTHETIC ADVANTAGE--IN LOCATING HERE. THAT--CONSIDERING OUR RELATIVELY SMALL MARKET, VIRTUAL ISOLATION, SHIPPING CHARGES AND OTHER HIGH COSTS--IS WHEN MOST OF OUR "WISHES" FAIL TO COME TRUE.

NEW INDUSTRIES ALSO NEED TO FEEL WELCOMED. WE ARE AN EXTREMELY DIVERSE COMMUNITY; ONE WITH MANY DIFFERENT OPINIONS, PRIORITIES, EXPECTATIONS, LIFESTYLES AND VISIONS OF THE FUTURE. NO SINGLE "WISH LIST" COULD POSSIBLY BEGIN TO SATISFY US ALL. INDEED, HOW MANY TIMES IN THE RECENT PAST HAS THIS COMMUNITY APPEARED TO WELCOME ANY NEW INDUSTRY--WHOLEHEARTEDLY AND WITHOUT CONTROVERSY?

IN THE MID-1980s, SPACE-RELATED ACTIVITIES WAS IDENTIFIED AS ONE OF THE MOST PROMISING HIGH TECH INDUSTRIES IN HAWAII--AN INDUSTRY WITH A FUTURE; ONE THAT COULD CREATE, DIRECTLY OR INDIRECTLY, A LARGE NUMBER OF RELATIVELY WELL-PAYING JOBS, SUPPORTING SERVICES AND SPINOFF BUSINESSES; ONE WITH A SYNERGISTIC EFFECT, THAT COULD HELP TO ACCOMPLISH A NUMBER OF OTHER STATE OBJECTIVES.

DEVELOPMENT OF A COMMERCIAL SATELLITE-LAUNCHING FACILITY WAS ONE OF THE SPECIFIC ACTIVITIES RESULTING FROM THIS DISCUSSION. BUT FIRST, THE STATE NEEDED TO DETERMINE WHERE, IF ANYWHERE, SUCH A

FACILITY COULD BE LOCATED IN HAWAII. A 1988 STUDY BY ARTHUR D. LITTLE, INC. DETERMINED THAT ONLY THE TWO SITES WITHIN THE DISTRICT OF KA'U COULD SATISFY BOTH SAFETY AND OPERATIONAL REQUIREMENTS.

THE NEXT NECESSARY STEP IS TO DETERMINE THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH A LAUNCH FACILITY.....AND THAT'S WHERE WE ARE TODAY. A DRAFT EIS HAS RECENTLY BEEN PUBLISHED AND WAS OFFICIALLY RELEASED ON AUGUST 23--JUST 10 WORKING DAYS AGO. IT IS STILL BEING REVIEWED BY OFFICIALS WITHIN THE STATE, AND A 90-DAY PUBLIC REVIEW PERIOD HAS BEGUN.

SOLICITING QUESTIONS AND CONCERNS--SUCH AS THOSE CONTAINED IN THE RESOLUTIONS BEFORE YOU--IS THE PURPOSE OF THE PUBLIC REVIEW PERIOD. WE HOPE EVERYONE WHO HAS QUESTIONS AND CONCERNS WILL TAKE THE TIME TO SUBMIT THEIR COMMENTS, SO THAT THIS PROCESS CAN BE AS THOROUGH AND MEANINGFUL AS POSSIBLE. EACH WRITTEN COMMENT MUST BE INCLUDED IN THE FINAL EIS, ALONG WITH AN APPROPRIATE RESPONSE. THIS PARTICIPATION CAN PROVIDE CRITICAL INSIGHT AND INFORMATION FOR THOSE WHO MUST ULTIMATELY DECIDE WHETHER OR NOT THE PROPOSAL SHOULD PROCEED.

IN CLOSING, DBEDT WOULD LIKE TO THANK YOU AGAIN FOR THIS OPPORTUNITY TO TESTIFY. WE RECOGNIZE THAT THE COUNCIL WILL CONTINUE TO RAISE QUESTIONS. WE HOPE, HOWEVER, THAT THESE RESOLUTIONS WILL NOT BE APPROVED. WE FURTHER HOPE THAT YOUR FINAL JUDGMENT WILL BE RESERVED UNTIL THE EIS IS A COMPLETED DOCUMENT--NOT JUST A WORK-IN-PROGRESS--AND ALL OF THE IMPORTANT ISSUES HAVE BEEN IDENTIFIED AND ADDRESSED. MAHALO.

Japa...se Chamber of Commerce & Industry of Hawaii

JCC&I

September 7, 1993

The Honorable Takashi Domingo, Chairman
Hawaii County Council Planning Committee
25 Aupuni Street
Hilo, HI 96720

RE: RESOLUTION NOS. 93-93 AND 102-93

Dear Chairman Domingo and Members of the Committee:

Please vote "NO" on both resolutions. There are many concerns regarding the Spaceport and its Environmental Impact Statement. The EIS process requires that problems be identified and possible solutions be allowed for public input. We should wait until the process is completed before making any decisions. A decision made in haste before all pieces of the puzzle are fitted may have negative long-term effects for the Island of Hawaii.

The process is just in the beginning stages. We see no reason why we cannot wait. A decision should be made only after all facts are available and the process is completed.

Sincerely,

Rodney Oshiro
President

RO/mi

COMM. NO. 548.1
Presented To: PC

11 Laula Road • Hilo, Hawaii 96720 • Phone: (808) 959-4248 • Fax: (808) 959-4249

12-153

HAWAII ISLAND BOARD OF REALTORS®, INC.

The Voice for Real Estate® in East Hawaii

REALTOR®

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07 September 1993

RECEIVED
Time 2:
Date 9/7/93
County Council / PC

Takashi Domingo
Planning Committee Chairman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Re: County Resolutions 93-93 and 102-93
Relating to the Space Industry

Dear Chairmen Domingo and Committee Members,

I am Robert Williams, President of the Hawaii Island Board of Realtors. Currently our membership exceeds 450 members and affiliates.

While the Hawaii Island Board of Realtors is not endorsing the spaceport concept, we feel it would be more prudent to defer any actions such as County Resolutions 93-03 and 102-93 until the 90 day public review period for the EIS has expired. The State of Hawaii has spent millions of dollars and years of time to prepare this document, and it only makes sense to allow the public and the esteemed members of the County Council ample time for review.

Hawaii County needs a strong economic base and while the Spaceport may or may not be one of the answers, we hope a careful and thorough examination of the benefits verses the losses is made prior to dismissal of the concept.

Sincerely,

Robert G. Williams

Robert G. Williams
President, Hawaii Island Board of Realtors

COMM. NO. 548.14
Presented To: PC

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Hawaii Island Board of Realtors
Hawaii Island Chamber of Commerce
Hawaii Island Contractors' Association
Hawaii Island Economic Development Board
Hawaii Island Portuguese Chamber of Commerce

Big Island Business Council

P.O. BOX 4815
HILO, HAWAII 96720
(808) 969-7863 / FAX (808) 935-7405

Kona Board of Re
Kohala Coast Resort Assoc.
Hawaii Island Restaurant Assoc.
Kona-Kohala Chamber of Comm
Kanoelehua Industrial Area Assoc
Japanese Chamber of Commerce and Industry of H

September 7, 1993

Time 2:
Date 9/7/93
County Council / PC

Takashi Domingo
Planning Committee Chairman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Re: COUNTY RESOLUTIONS 93-93 and 102-93
Relating to the Space Industry

Dear Councilman Domingo and Committee Members,

I am Glenetta Bennett, President of the Big Island Business Council. The Council is made up of twelve member groups representing both large and small business interests on the island of Hawaii.

The Draft Environmental Impact Statement for the proposed Commercial Satellite Launching Facility at Palima Point in Kau has only recently been made available to the public. It is a massive, technical document that cannot possibly be absorbed and analyzed in such a short period of time.

We oppose passage of either of these resolutions for exactly this reason. A systematic review process is in place to allow for public discussion, comment and questions. This process should not be prematurely aborted, but rather, allowed to run its course.

COMM. NO. 548.1
Presented To: PC

The concept of a space launch facility has been under discussion and investigation for years. Millions of dollars have been expended. Let us complete the process, whatever the outcome. The people of this island deserve no less.

Thank you for the opportunity to present our viewpoint.

Sincerely,

Glenetta Bennett
President
Big Island Business Council

12-154

September 6, 1993

Received
Time ..... By .....
Date 9/7/93
County Council / PC

The Planning Committee
Hawaii County Council
County Building
Hilo, Hawaii 96720

Re: Spaceport concerns

To whom it may concern:

My name is Richard Kawano, and I am a former aerospace technician living in Hilo. I was born and raised in Waiakea, and like many of my colleagues, I had to move away to the Mainland to find work in my field. My children currently live on the Mainland working in the aerospace industry as electrical engineers. There are many of us here on the Big Island and throughout the state, and we are saddened by what we see and hear about the industry we know so well. We cannot understand how so much misinformation is being spread by people who have no idea about the real inner-workings of commercial space launch vehicles.

I worked for Hughes Aircraft for 20 years as the Scientific Computer Operational Manager. I devised fail-safe procedures for operational and engineering personnel during environmental chamber testing for all Surveyor spacecraft which was the first successful lunar landing leading to further space exploration, and the SYNCOM project which was the very first commmunications satellite, and various other military projects.

I joined the aerospace industry in its early years, so I have seen many generations of technological progress. Believe me, it is much safer than taking off or landing in an airplane, 10 times safer than driving a car, and the only accidents to my fellow-workers and I were tripping over equipment, like any other industrial job. Yes, there have been very tragic occurences, even to our own Ellison Onizuka, who in his own words died reaching for the stars.

I would like to tell you the real, hard facts of launching, based on what I have read in the Environmental Impact Statement and newspaper reports:

COMM. NO. 548.
Presented To: PC

1. FUEL: Hypergolic liquid propellants all require an oxidizer to ignite and if transported separately should eliminate the danger of combustion in event of an accident. There are oxigen retardant fire extinguishers such as Halon 1301.

2. NUCLEAR POWER: In all the publications I've read there is no mention of intent to use Nuclear power.

3. MILITARY LAUNCHES: Military has their own requirements and security systems that would prevent them from using a "civilian" facility.

4. COMMUNITY IMPACT: Santa Maria, Lompac and other communities around Vandenburg Air Base was solely agricultural but the marriage between the space port and agriculture has worked well to form a new economic base.

5. BENEFITS: Education, new job opportunities and a new economic base between agricultural, tourism and the scientific field make Hawaii a better place to live.

I have been to several presentations in recent weeks, and would also like to say that it seems that people are absolutely opposed to the process, not the project itself. From what I have seen, the process has been badly handled which is a shame for all of us. We must together continue to find the real facts. The County must insist on being involved. But please continue to search for the information, because we need new hope and new opportunities.

I know what the aerospace industry has meant to me and my family. We should'nt have to go away to have such opportunities. None of the people who are protesting are involved in any way in aerospace, so though they mean well, they just don't know the real facts.

I hope this information will help your decision to continue trying.

Yours sincerely,

Richard Kawano

12-155

HAWAII ISLAND Economic Developm Board

September 7, 1993

Time ____ By ____
Date 9/7/93
County Council / PC

The Honorable Takashi Domingo
Chairman, Planning Committee
Hawaii County Council
25 Aupuni Street
Hilo, HI 96720

Re: County Resolution Nos. 93-93 and 102-93
Relating to Space Industry
Planning Committee Public Hearings
Tuesday, September 7, 1993 - 1:30 P.M.

Dear Mr. Chairman and Members of the Committee:

My name is Robert E. Bethea, and I am president of the Hawaii Island Economic Development Board (HIEDB). HIEDB has supported the process designed to gather the facts to determine the feasibility of a space launch facility in Ka'u. I point that our organization consists of members who reside or have interests in all areas of this island. Accordingly, we share concerns about the potential impacts of this project in the Hilo area, in the Volcano area, in Ka'u and generally in West Hawaii.

However, we are also aware that there are potential economic benefits which could flow from such a facility and which could be very significant to certain communities, particularly Ka'u if sugar fails in that area.

At the present we are just beginning the environmental review process, and we believe that it is premature to issue a resolution asserting that the County of Hawaii is opposed to the establishment of a launch facility. We believe the wise course of action is to allow the environmental review process to continue, and then to make a final judgment when the facts are all in and when a rational, final assessment can be made.

Very truly yours,

Robert E. Bethea, President
1028w

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J. Anthony Henley
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Bishop Estate
*M. Luce Contractin
*Nansay Hawaii Inc

*Sustaining Membe
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Isemoto Contractin
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Kohala Ranch
KTA Super Stores
MacFarms of Hawa
Mauna Kea Proper
Pacific Machinery
Realty Investment
W.H. Shipman, Lt
Sure Save Super M
Waikoloa Land Co
Waimana Enterpri
Yamada Diversified
Corporation
Young Brothers, In

Ex-officio Member
The Honorable
Stephen Yamaan
Spencer K. Schut
Mukuli Hannemar
Edward Kormondy

Executive Directo
Paula Heinrich

COMM. NO. 548.
Presented To: F

7 September 1993

Good day. My name is Francois L'Orange & I am Co-chair of the Hawaii County Green Party.

I am here today to inform the Council that the Hawaii County Green Party heartily endorses Resolution 93 from Councilwoman Keiko Bonk Abramson.

The Green Party supports the Resolution for a number of reasons two of which I shall address here today.

First of all is the ecological & environmental devestation a rocket Launch facility would inflict on & land of Kau. To cite but one example from the DEIS: the report states coyly that mitigation measures will be taken in the event of an earthquake when a rocket is on the launch pad. What mitigation are they talking about besides sounding the alarm & running like hell from the ensuing explosion? Again the report states they will mitigate the effects of a tsunami on a launch pad (placed incedently in a tsunami zone). What are they talking about here? Perhaps cleaning up after the waves pass by is what they mean by mitigation?

Second is the fundamental right of the governed to self determination; that is the basic right to make informed decisions on those issues which directly effect their community. In this instance the State has rammed this project down the gullets of the Kau community for seven years with no regard whatsoever for the will of the people directly affected. This is the message the Governor & DBEDT still have not received; the will of the Kau community is for self-determination & a self sustaining economy.

The Hawaii County Green Party wholeheartedly supports the people of Kau on this decision. We urge the Council to pass this resolution.

Thank you.

COMM. NO. 548.19

12-156

HICA HAWAII ISLAND CONTRACTORS' ASSOCIATION

494 C KALANIKOA STREET • HILO, HAWAII 96720 • TELEPHONE (808) 935-1316

September 7, 1993

The Honorable Takashi Domingo,
Chairman, Planning Committee,
and Members
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Dear Council Members:

The Hawaii Island Contractors' Association has long been on record in favor of the development of a space launch facility in the Ka'u district, if it can be done in a manner that is environmentally and physically safe.

We note that your committee has before it two resolutions that would oppose the development of that launch facility.

We also note that the State of Hawaii has expended several million dollars in the creation of the draft Environmental Impact Statement, which was published recently.

We would urge that your committee defer any action on Resolutions 102-93 and 93-93 until such time as the public and affected agencies have an opportunity to review and comment upon the Draft Environmental Impact Statement, and until such time as it is determined if there is a legitimate developer available for such a facility.

Respectfully,

Byron Fujimoto
President

COMM. NO. 548.20
To: PC

SEPTEMBER 7, 1993

COUNTY OF HAWAI'I
HAWAI'I COUNTY COUNCIL

RE: SPACEPORT EMPLOYMENT, AND LAUNCH QUOTES.

COUNTY COUNCIL MEMBERS:

HAWAII TRIBUNE HERALD, SEPT. 7, 1993, ARTICLE OSI WITHHOLDS KEY FINANCIAL INFO SOUGHT BY A COUNTY OFFICIAL, BY DAVE SMITH. THE NUMBER OF EMPLOYEE'S REQUIRED AT THE PROPOSED PALIMA POINT SPACEPORT HAS ALWAYS BEEN SUSPICIOUS, SINCE THE OFFICE OF OSI HAS CLAIMED THAT ONLY 15 TO 22 ROCKETS A YEAR WOULD BE LAUNCHED. AT THIS LOW FREQUENCY OF ACTUAL LAUNCHINGS THERE WOULD NOT BE A NEED FOR 270 SEMI-SKILLED JOBS. HOWEVER, IN THE NEXT FEW YEARS OUR NATION PLANS TO RETURN TO THE MOON, AND INHABIT THE LUNAR SURFACE FOR EXPLORATION, AND POSSIBLE STATEHOOD OR NATIONAL TERRITORY. THE JAPANESE ARE AT THIS TIME PLANNING EXPEDITIONS TO BOTH MOON/MARS IN DIRECT COMPETITION TO OUR NATION GOALS.

I NO LONGER CHALLENGE THE NUMBER OF SEMI-SKILLED JOBS AT THE LAUNCH FACILITY, BUT THE NUMBER OF STATED LAUNCHINGS PER YEAR. IF OUR LUNAR INITIATIVE DOES BECOME REALITY, OUR FREQUENCY OF MONTHLY ROCKET LAUNCHES WOULD INCREASE WITH THE DELTA/ATLAS CLASS ROCKETS. WITH THE DEVELOPMENT OF THE VERTICAL TAKE OFF AND LANDING (VTOL) VEHICLES, THESE ROCKETS ARE DESIGNED TO USE EITHER THE CHEMICAL OR THERMIONIC ENGINES WOULD RETURN TO THE PALIMA POINT LAUNCH SITE AFTER THEIR MISSION WAS COMPLETED.

OUR SPACEPORT WOULD RECEIVE DOUBLE DUTY, VERTICAL TAKE OFF AND LANDING IN THE NEAR FUTURE WITH THE NEW GENERATION OF LAUNCH VEHICLE. I STRONGLY ADVISE A STUDY BE COMPLETED AS TO THE MISSION OF OUR SPACE INDUSTRY, NATIONAL/INTERNATIONAL GOALS, AND HOW THE ISLAND OF HAWAI'I PLAYS A ROLE IN THESE UP COMING SPACE PROGRAMS. I HAVE READ NO RULE LIMITING THE NUMBER OF YEARLY LAUNCHING, OR NOT ALLOWING THE VERTICAL RETURN OF THE LAUNCH VEHICLE.

COMM. NO. 548.21
To: PC

COMPARING THE DANGERS AND HAZARDS OF THE SPACEPORT TO AIRPORTS, OR AUTOMOBILE ACCIDENTS, IT IS IMPORTANT TO REALIZE THAT NEITHER ARE COMPARABLE. ROCKETS ARE SUBJECT TO STRESS LOADS FROM LAUNCH TO ORBIT THAT THESE OTHER VEHICLES NEVER RECEIVE. FURTHER, OUR SUCCESSES WITH LAUNCH VEHICLES ARE EXTREMELY LOW, AND THE FAILURE RATE OF ROCKETS IN COMPARISON TO OTHER MANUFACTURED VEHICLE ARE UNACCEPTABLE. I SUBMIT THAT THE 90 DAY CLOCK STOP UNTIL THE FEDERAL AND STATE EIS IS COMPLETED AND WE KNOW THE GOALS/MISSIONS OF THE SPACEPORT USERS, THE TYPES OF LAUNCH VEHICLES, LAUNCH RESTRAINTS/CONSTRAINTS, LIABILITIES, AND FUELS INVOLVED. AT THIS TIME THE PUBLIC AND COUNTY COUNCIL WOULD HAVE A BETTER PICTURE OF THE SPACEPORT'S INITIATIVE FROM THEIR COMMENTS. TOO MY KNOWLEDGE NO OFFICIAL HAS EVER DENIED THE USE OF NUCLEAR FUELED ROCKETS, OR THE VERTICAL TAKE OFF AND LANDING VEHICLES.

I HAVE ENCLOSED MY STATEMENT THAT HAS BEEN FAXED TO SENATOR HOLLINGS COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION IN WASHINGTON D.C..

SINCERELY,

William F. Hachmeister

WILLIAM F. HACHMEISTER

ENCLOSURE: STATEMENT TO SENATOR HOLLINGS.

RESOLUTION NO. _____

URGING THE C... ATION OF ALL SPACEPORT DEVELOPM... ON HAWAI'I ISLAND

WHEREAS, the State, through its Department of Business, Economic Development & Tourism (DBEDT) and the Office of Space Industry, has expended in excess of seven million dollars to promote and develop a spaceport in the Ka'u district on Hawai'i Island, and has produced a Draft Environmental Impact Statement (DEIS) for said development; and

WHEREAS, this DEIS outlines fifteen significant unresolved issues and describes numerous sociocultural impacts, including but not limited to unspecified social changes, establishment of a 10,400-acre population control zone, and public use restrictions on large areas of ceded 5(f) trust lands, both onshore and offshore; and

WHEREAS, the preferred site at Palima Point is adjacent to a major fault zone and located in an area that poses the highest risk of hazardous lava inundation and major seismic activity; and

WHEREAS the State, through the Office of State Planning, has said it will seek legislation to discourage development and future growth in high risk areas subject to lava inundation and major earthquakes; and

WHEREAS, ground transportation trips and planned rocket launches will expose island residents to unacceptable health, traffic, and safety hazards, including the potential for loss of life and property, and many of which may cause irreparable damage to the island's natural resources for present and future generations, including contamination of air, land, and water; and

WHEREAS, the State has enacted legislation (Act 172) to prohibit the launch of space vehicles within the territory of the State of Hawai'i that carry weapons of destruction, nuclear waste materials or use radioactive materials as a power source; and

WHEREAS, the State Attorney General believes that such a prohibition could be preempted by federal law and thereby deprive the State and County of authority to approve of and control a space vehicle's payload or fuel source; and

WHEREAS, about 65 percent of people responding to an island-wide survey conducted for the DEIS, including the majority of respondents to polls conducted by Senator Andy Levin, and Representatives Jerry Chang and Virginia Isbell, were opposed to the development of a spaceport on Hawai'i Island; and

WHEREAS, the Preamble of the Constitution of the State of Hawai'i affirms that the people reserve the right to control their destiny, to nurture their integrity and culture, and to preserve the quality of life they desire; and

WHEREAS, Article IX, Section 8 of this Constitution empowers the State to promote and maintain a healthful environment, including the prevention of any excessive demands upon it and the State's resources; and

WHEREAS, Article XI, Section 1 of this Constitution mandates that, for the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawai'i's natural beauty and all natural resources and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of self-sufficiency of the State; and

WHEREAS, Article XI, Section 9 of this constitution provides, in part, that each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources;

NOW THEREFORE BE IT RESOLVED by the Association of Hawaiian Civic Clubs in Convention at Las Vegas, Nevada, this 30th day of October, 1993, that the Hawai'i State Government, and DBEDT in particular, be urged to take immediate action to (1) discontinue all plans to promote and develop a spaceport on Hawai'i Island, (2) prohibit any additional expenditures of public funds toward such a development, and (2) close the Office of Space Industry; and

BE IT FURTHER RESOLVED that certified copies of this resolution be transmitted to Governor John Waihe'e, Senate President James Aki, Speaker of the House Joe Souki, Muff Hannemann, Director of DBET, Senator Andy Levin, Representatives Virginia Isbell and Jerry Chang, Stephen K. Yamashiro, Mayor-Hawaii County, Kalani S. Schutte, Chairman-Hawaii County Council.

SUBMITTED BY: Kona Hawaiian Civic Club
REFERRED TO:
ACTION:

12-158

.ONA HAWAIIAN CIVIC C
Post Office Box 4098
Kailua-Kona, Hawaii 96745-4098

TELECOPIER COVER SHEET

Date: September 7, 1993

Number of Pages Transmitted (including this page): 2

Addressee: Councilman Takashi Domingo, Chair- Committee on Planning

Telefax #: 969-3291

Sender: Leimana Damate, President

Re: Proposed Ka'u Spaceport

Special Instructions or Message:

Per our telephone conversation with Sue Keohokapu this date, we are transmitting a copy of the resolution developed by the Kona Hawaiian Civic Club in opposition to the State's proposed spaceport at Ka'u.

This resolution has been introduced by our Club in connection with the upcoming Association of Hawaiian Civic Clubs' annual convention to be held in Las Vegas next month.

We had planned to have one of our delegates read this resolution into the record at the 1:30 meeting of your Committee on Planning, but unfortunately that person will be unable to attend today's meeting.

Therefore, we are submitting our testimony, consisting of our one-page resolution, for consideration by you and your committee members as you review Resolutions 93 and 102 proposed by Councilmembers Bonk-Abramson and Rath. We will appreciate your distributing copies of our resolution to the other members of your committee.

Thank you for your help in this important matter.

COMM. NO. 548.1
Presented: To PC

[illegible] report: planning missions to the Moon and Mars. Space Exploration Initiative

Ad Astra, Dec 1990 v2 n11 p18(15).

Author: Leonard David

Subjects: Space flight to the moon - Planning
Aerospace industry - Research
Space flight to Mars - Planning

Companies: TRW Inc. - Research
Martin Marietta Corp. - Research
General Dynamics Corp. - Research
Boeing Co. - Research
Rockwell International Corp. - Research
McDonnell Douglas Corp. McDonnell Douglas Astronautics Company Huntington Beach - Research
Lockheed Missiles and Space Company Inc. - Research

Gov't Agencies: Space Exploration Initiative - Planning

Features: illustration; photograph

AN: 09[illegible]

Database: Expanded Academic Index
Subject: lockheed missiles and space company inc.
Library: University of Hawaii at Hilo

Harvest for the heavens. (research on gardening in space)

Ad Astra, Jan 1990 v2 n1 p5(1).

Subjects: Aerospace industry - Research
Hydroponics - Research

Companies: Lockheed Missiles and Space Company Inc. - Research

People: Schwartzkopf, Steven - Research

Features: illustration; photograph

AN: 08356409

Abstract: Chinese scientists have collaborated with Russian scientists on planned space missions in 1994 and 1996to explore the planet Mars. Two spacecrafts will study Mars' climatic and geological conditions and search for life forms. The Russian Academy of Sciences and the Chinese Academy of Sciences have been conducting joint environmental and space studies using high-altitude balloons for the past two years. Previous Russian missions to Mars have gathered substantial information on the planet and scientists hope to obtain more data through the new missions.France, Italy and the US will also participate in the space project.

Subjects: Space flight to Mars - Planning
Mars (Planet) - Discovery, exploration, etc.

Organizations: Chinese Academy of Sciences - Research

AN: 13851504

Database: Expanded Academic Index
Subject: mars (planet)
Library: University of Hawaii at Hilo
Holdings: Library subscribes to Periodical.
Please consult UHH Periodicals List for complete holdings.

U.S. probe begins journey to Mars. (Mars Observer)

Aviation Week & Space Technology, Oct 5, 1992 v137 n14 p22(3).

Author: James T. McKenna

Abstract: NASA's Mars Observer probe was launched via a Titan 3 rocket from Cape Canaveral's newly renovated Complex 40 on Sep 25, 1992. Early post-launch communications with the probe failed to confirm that its high-end antenna and two of its six solar panels had been deployed.

Subjects: Space vehicles - Launching
Mars (Planet) - Discovery, exploration, etc.

Products: Mars Observer (Space probe) - Planning

Features: illustration; photograph; chart

AN: 12711695

Database: Expanded Academic Index
Subject: mars (planet)
Library: University of Hawaii at Hilo
Holdings: Library subscribes to Periodical.
Please consult UHH Periodicals List for complete holdings.

Cleanup probe for journey for Mars. (NASA's Mars Observer)

New Scientist, Sept [illegible]

Getting it migr r Mars. Mars exploration proj.

Space Policy, Feb 1993 v9 n1 p55(5).

Author: N. Jasentuliyana

Abstract: A manned mission to the planet Mars is only possible with international cooperation given the political, technological and economic difficulties in organizing such an expedition. International cooperation has been manifested in other space-faring ventures such as the European Space Agency and the activities of bilateral and multilateral space projects. Advances in propulsion, power, life-support systems, and communication, control and navigation systems that will be developed shall benefit mankind.

Subjects: Mars (Planet) - Discovery, exploration, etc.
International cooperation - Evaluation
Astronautics - International aspects

Organizations: Association of Space Explorers-U.S.A. - Evaluation

AN: 13911770

Database: Expanded Academic Index
Subject: mars (planet)
Library: University of Hawaii at Hilo
Holdings: Library subscribes to Periodical.
Please consult UHH Periodicals List for complete holdings.

China joins Russian mission to Mars.

Beijing Review, Nov 9, 1992 v35 n45 p12(1).

Abstract: Chinese scientists have collaborated with Russian scientists on planned space missions in 1994 and 1996to explore the planet Mars. Two spacecrafts will study Mars' climatic and geological conditions and search for life forms. The Russian Academy of Sciences and the Chinese Academy of Sciences have been conducting joint environmental and space studies using high-altitude balloons for the past two years. Previous Russian missions to Mars have gathered substantial information on the planet and scientists hope to obtain more data through the new missions.France, Italy and the US will also participate in the space project.

Subjects: Space flight to Mars - Planning
Mars (Planet) - Discovery, exploration, etc.

Organizations: Chinese Academy of Sciences - Research

AN: 13851504

Database: Expanded Academic Index
Subject: mars (planet)
Library: University of Hawaii at Hilo
Holdings: [illegible]

AN: [illegible]

Database: Expanded Academic Index
Subject: mars probes
Library: University of Hawaii at Hilo
Holdings: Library subscribes to Periodical.
Please consult UHH Periodicals List for complete holdings.

Japan sets sights on Moon and Mars. (probes planned)(includes related article on satellite launching)

Astronomy, June 1993 v21 n6 p22(1).

Abstract: Japan is planning two space probes for 1995: one for the Moon which will take soil samples and carry a seismometer and one for Mars which will photograph the surface from 150 miles up. The Feb 1993 Japanese launch of a astronomy satellite is also detailed.

Subjects: Mars probes - Planning
Lunar probes - Planning
Japan - Science and technology policy

Locations: Japan

AN: 13818449

Database: Expanded Academic Index
Subject: mars probes
Library: University of Hawaii at Hilo
Holdings: Library subscribes to Periodical.
Please consult UHH Periodicals List for complete holdings.

Martian mystery. (belief in aliens inhabiting Mars)

Omni, May 1993 v15 n7 p79(1).

Author: Patrick Huyghe

Abstract: UFO enthusiasts believe that a UFO caused a Soviet space probe to crash into the Martian moon Phobos, and the belief has been supported by Soviet scientists. A US astronomer later introduced evidence that dismissed the UFO theory.

Subjects: Unidentified flying objects - Sightings and encounters
Mars probes - Observations

AN: 13550358

September 21, 19[illegible]

'93 SEP 21 [illegible] 24

To Whom it May Concern:

After reviewing the draft Environmental Impact Statement (EIS) for the proposed Ka'u Spaceport, I asked the State of Hawaii's Office of Space Industry (OSI) for documents to support the economic benefits cited in the EIS. The Executive Director of OSI, Ken Munechika, quickly denied my request stating that the material was "predecisional and deliberative in nature." However, after much political pressure from Councilman Jim Rath, Munechika relented and sent me the "Financial Feasibility Studies" that I had asked for.

The most significant aspect of these "Financial Feasibility Studies" is that they are not predicated upon a need shown by "market analysis." *In other words, there has never been a study that shows a market need for a spaceport in Ka'u – there is more than adequate worldwide launch capacity into the foreseeable future!*

If this is so, then OSI has misled the State Legislature, the County Council and the business community concerning the economic viability of a spaceport in Ka'u.

For example, the economic benefits section of the EIS deceives us by implying that these benefits are *expected*, when in fact OSI's own "Financial Feasibility Studies" *expect* that there is no market for a spaceport in Ka'u.

It just doesn't make sense. If there is no market for a spaceport in Ka'u, why does the Waihee administration keep wasting taxpayer's money? Bad habit or hidden agenda?

Aloha,

Jay Hanson, member of the Hawaii County Planning Commission
78-6622 Alii Drive,
Kailua-Kona, HI 96740
Phone 322-7268 or 322 7951 or 329-6645 -- Fax 329-6523

Comm. No. 548.22
File No. [illegible]
Ref. To: PC
Ref. Date SEP 21 1993

SPENCER K. SCHUTTE
Chairman & Presiding Officer

BRIAN I. DE LIMA
Vice-Chairman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

JAMES Y. ARAKAKI
KEIKO BONK-ABRAM
WILLIAM K. CHILDS
TAKASHI DOMINGO
HELENE H. HALE
JAMES M. RATH
ROBERT F. ROSEHILL

September 22, 1993

To: Takashi Domingo, Chairman
Planning Committee

From: Spencer K. Schutte, Chairman
Hawaii County Council

Re: Feasibility Study

Attached is the Financial Feasibility Studies, Related to the Proposed Hawaii Spaceport for Ka'u. This is being submitted to your committee for review and consideration.

Comm. No. 545.2
File No.
Ref. To: PC
Ref. Date SEP 21 [illegible]

Financial Feasibility Studies Related to the Proposed Hawaii Spaceport

Office of Space Industry
Department of Business, Economic Development and Tourism
September 1993

In February of 1993 the Department of Business Economic Development and Tourism (DBEDT) released a Conceptual Plan and Project Description which discussed the economic feasibility of the proposed commercial satellite launching facility. The results of a financial model analysis were presented along with many of the assumptions underlying that model. This financial data was provided to Decision Analysts Hawaii for their use in preparing the financial analysis section of the Environmental Impact Statement.*

Due to public and government interest in the financial aspects contained in the EIS studies, DBEDT has prepared a more detailed information package. It contains a discussion of the development of the financial model and spreadsheet printouts for three different launch rate scenarios.

Dr. Joseph Miccio, professor emeritus at the University of Hawaii's College of Business Administration assisted in structural development of the financial model and with general financial assumptions. Mr. Peter Minderman, former Director of Engineering Development at Kennedy Space Center assisted with specific spaceport facilities cost estimates and provided guidance on cost phasing and development strategy.

*EIS Volume IX, Appendix A, Reference 1

A commercial satellite launching facility has been proposed for the Big Island to take advantage of Hawaii's unique mid-Pacific location and ability to launch into any orbit from a single launch site.

A fundamental question is: can such a facility make money, and if so what role should the State play in supporting its development?

Role of the State

The state will not develop or operate the spaceport. This will be undertaken by a consortium of private companies. It will be their capital that is at risk, and in fact the launch facility will not be built if private industry is not willing to make the investment The state is studying the impacts of conducting launch operations and has recently released an extensive analysis in the Environmental Impact Statement. If the project moves forward the State will assist by making necessary off-site infrastructure improvements, acquiring control of land within the population control zone and assuming a safety oversight role.

Feasibility Analysis

The satellite launch market is difficult to assess. Conservative estimates show that there is more than adequate worldwide launch capacity through the year 2,000. New technologies as well as events like the military draw down and the dissolution of the former Soviet Union have had a profound effect on the commercial market. Recently proposed low earth orbit communications systems comprised of dozens of satellites may result in market expansion. University research programs could open up new opportunities for scientific studies with frequent launches of small payloads.

Due to these uncertainties, DBEDT has not based its spaceport feasibility studies solely on market analysis. We have chosen three different launch rates for analysis: 15, 18 and 22 orbital launches per year.

Results

Achieving success in an endeavor of this type will not be easy. There are no other purely commercial launch facilities currently in operation. However, many states and countries have realized the potential and are striving to develop their own spaceports.

DBEDT's financial feasibility analysis has shown that it will be possible but difficult for a consortium to operate the spaceport at a profit with fewer than 15 orbital launches per year. As the launch rate increases; so do profits.

Financial Model Assumptions

The purpose of the financial projection is to gauge the financial feasibility of a launch facility in Hawaii from the perspective of a private consortium involved in the development. Projections are based on assumptions for a conceptual plan, and not an actual design. For this reason, specific amounts (those for maintenance and vehicle costs, for example) are based on preliminary estimates. The results, therefore, should be used strictly to gauge the order of magnitude of revenues and expenses, and not for specific financial planning.

As is necessary for any financial projection, many assumptions were used in providing the inputs for the model. Detailed financial assumptions are listed in the Assumptions pages of the model. Other assumptions include:

Role of the Consortium. The consortium would develop all areas common to all launch vehicles, such as the roads, tracking facilities, and propellant storage and payload processing areas, but not launch vehicle specific areas, such as the launch pads.

Launch Rates. The launch rates used in the model can be achieved through the conventional processing techniques used at existing launch ranges. Although these rates constitute a significant percentage of the available launch market, they are achievable assuming an anchor tenant with high launch rates, such as one of the proposed low earth orbit communication satellite systems.

Launch Prices. The launch prices are made up of two components: range support prices and payload processing prices. Range support includes range safety, propellant storage and technical services. Payload processing includes spacecraft integration and check-out, fueling, and spin-balancing (if necessary).

Capital Costs. Capital costs incurred by the developer would be for on-site roads, utilities, site development, buildings, equipment, and vehicles, as well as margins for contractor's profit, general requirements, and contingencies. Projected capital costs for the developer range from $67 million to $70 million.

Other Assumptions. Additional assumptions include a debt-to-equity ratio of 1:1, an inflation rate of 4%, a federal corporate tax of 34%, and a state tax of 6.4%. The financial model included assumed launch rates, staffing and capital expenditure schedules as inputs.

Conservative
Launch Assumptions (15 launches per year)

Pricing (in year 4, in millions):

sELV: $1.50
mELV: $2.70
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)
1	0	0
2	0	0
3	0	0
4	6	0
5	9	2
6	10	4
7	10	5
8	10	5
9	10	5
10	10	5
11	10	5
12	10	5
13	10	5
14	10	5
15	10	5

Financial Assumptions Revised: [illegible] Jan 93

General Assumptions

		Variable Name
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	APAvgDays
Avg days in A/R:	0 days	ARAvgDays

Inflation Assumptions

Inflation Rate:	4%	Inflation
Construction Inflation Rate	6%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions

Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CapEngCost
General Requirements (% of Capital	9%	CapGenReq
Contractor's Profit & Bonds (% of C	8%	CapContProfit
Contingencies (% of Capital):	15%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replcmt (% of Depreciat):	30%	CapRepl

	Year 1	Year 2	Year 3	Year 4	Year 5	
Building Cost Phasing:	0%	30%	50%	20%	0%	PhaseBldg
Machinery Cost Phasing:	0%	20%	30%	30%	20%	PhaseMach
Engineering Cost Phasing:	30%	30%	20%	20%	0%	PhaseEng

Operating Cost Assumptions

Operating Cost Mult (% of Cost):	100%	OperCostMult
Benefits (% of Salary):	40%	Benefits
Supplies (% of Salary):	10%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hilo (Per sf/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	5%	MaintMach

Debt/Equity Assumptions

Leverage (Debt as a % of capital):	50%	Leverage
Long Term Interest Rate:	6.5%	InterestLong
Short Term Interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	5 yrs	TermShort

Depreciation Assumptions

Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Eqpt Life (yrs):	7 yrs	DeskEqptLife
Salvage Value:	$0	DeskEqptSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Repl year	3 yr	CapReplYr
Startup %:	5%	CapReplPct
Life (yrs):	3 yrs	CapReplLife
Salvage Value:	$0	CapReplSalvage

Average Launch Assumptions (18 launches per year)

Pricing (in year 4, in millions):

sELV: $1.60
mELV: $2.85
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)
1	0	0
2	0	0
3	0	0
4	6	0
5	9	2
6	9	4
7	12	6
8	12	6
9	12	6
10	12	6
11	12	6
12	12	6
13	12	6
14	12	6
15	12	6

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yr.:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Inflation Multiplier:	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	

Launch Rate:

Rocket A (sELV):	0	0	0	6	9	10	10	10	10	10	10	10	10	10	10	10
Rocket B (mELV):	0	0	0	0	2	4	5	5	6	5	5	5	5	5	5	5

Pricing:

Rocket A, Per Launch:	0.00	0.00	0.00	1.50	1.56	1.62	1.69	1.75	1.82	1.90	1.97	2.05	2.13	2.22	2.31	
Rocket B:	0.00	0.00	0.00	2.70	2.81	2.92	3.04	3.16	3.28	3.42	3.55	3.70	3.84	4.00	4.16	

Income Statement:

Revenues:																
Launch:																
Rocket A:	0.00	0.00	0.00	9.00	14.04	16.22	16.87	17.55	18.25	18.99	19.74	20.53	21.35	22.20	23.09	
Rocket B:	0.00	0.00	0.00	0.00	5.62	11.68	15.19	15.79	16.42	17.08	17.77	18.48	19.21	19.98	20.78	
Total:	0.00	0.00	0.00	9.00	19.66	27.91	32.06	33.34	34.67	36.06	37.50	39.00	40.56	42.19	43.87	
Expenses:																
Expenses, Fixed:																
Utilities:	0.00	0.01	0.08	0.29	0.54	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52	
Rent:	0.60	0.00	0.00	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80	
Maintenance:	0.02	0.60	1.60	2.34	2.22	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02	
Insurance:	0.01	0.24	0.63	0.88	0.96	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42	
Salaries, Bnfs, & S	0.00	0.31	1.21	3.23	5.40	7.74	10.26	10.67	11.10	11.54	12.01	12.49	12.99	13.51	14.05	
Total:	0.64	1.16	3.54	7.91	10.84	13.62	16.67	17.34	16.63	18.75	19.50	20.28	21.09	21.94	22.81	
Depreciation:	0.05	1.07	2.87	4.15	4.72	4.80	4.86	4.93	4.95	4.97	4.98	4.98	4.99	4.99	4.99	
Total:	0.09	2.23	6.41	12.06	15.56	18.42	21.53	22.27	22.58	23.72	24.46	25.26	26.08	26.92	2	
Earnings Before Int. & Taxes	-0.09	-2.23	-6.41	-3.06	4.10	9.49	10.53	11.07	11.69	12.34	13.02	13.74	14.49	15.26	16.07	
Net Interest:																
Interest Income:	0.03	0.09	0.16	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
Interest Expense:	0.07	0.89	2.28	2.96	2.98	3.74	2.56	2.41	2.23	2.04	1.84	1.62	1.39	1.14	0.88	
Total:	-0.04	-0.80	-2.13	-2.78	-2.71	-2.56	-2.40	-2.23	-2.05	-1.86	-1.66	-1.44	-1.21	-0.96	-0.70	
Earnings Before Taxes:	-0.13	-3.03	-8.54	-5.85	1.39	6.93	8.13	8.84	9.64	10.48	11.37	12.30	13.28	14.30	15.37	
Taxes:	0.00	0.00	0.00	0.00	0.56	2.80	3.28	3.57	3.89	4.23	4.59	4.97	5.36	5.78	6.21	
Net Profit:	-0.13	-3.03	-8.54	-5.85	0.83	4.13	4.84	5.27	5.75	6.25	6.77	7.33	7.91	8.52	9.16	

Average
Launch Assumptions (18 launches per year)

Pricing (in year 4, in millions):

sELV: $1.60
mELV: $2.85
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)
1	0	0
2	0	0
3	0	0
4	6	0
5	9	2
6	12	4
7	12	6
8	12	6
9	12	6
10	12	6
11	12	6
12	12	6
13	12	6
14	12	6
15	12	6

Financial Assumptions Revised: 13 Jan 93

General Assumptions

		Variable Name
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	APAvgDays
Avg days in A/R:	0 days	ARAvgDays

Inflation Assumptions

Inflation Rate:	4%	Inflation
Construction Inflation Rate	6%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions

Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CapEngCost
General Requirements (% of Capital	9%	CapGenReq
Contractor's Profit & Bonds (% of C	6%	CapContProfit
Contingencies (% of Capital):	12%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replcmt (% of Deprecn):	20%	CapReal

	Year 1	Year 2	Year 3	Year 4	Year 5	
Building Cost Phasing:	0%	30%	50%	20%	0%	PhasBldg
Machinery Cost Phasing:	0%	20%	30%	30%	20%	PhasMach
Engineering Cost Phasing:	30%	30%	20%	20%	0%	PhasEng

Operating Cost Assumptions

Operating Cost Mult (% of Cost):	100%	OperCostMult
Benefits (% of Salary):	35%	Benefits
Supplies (% of Salary):	9%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hilo (Per sr/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	5%	MaintMach

Debt/Equity Assumptions

Leverage (Debt as a % of capital):	50%	Leverage
Long Term Interest Rate:	6.5%	InterestLong
Short Term Interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	8 yrs	TermShort

Depreciation Assumptions

Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Eqpt Life (yrs):	7 yrs	DeskEqptLife
Salvage Value:	$0	DeskEqptSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Real year	3 yr	CapRealYr
Startup %:	5%	CapRealPct
Life (yrs):	3 yrs	CapRealLife
Salvage Value:	$0	CapRealSalvage

Optimistic
Launch Assumptions (22 launches per year)

Pricing (in year 4, in millions):

sELV: $1.70
mELV: $3.00
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)	Vehicle C (mELV)
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	6	2	0
6	9	4	0
7	12	5	2
8	12	5	4
9	12	5	5
10	12	5	5
11	12	5	5
12	12	5	5
13	12	5	5
14	12	5	5
15	12	5	5

Income Statement:

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rel.Yrs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Inflation Multiplier:	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	
Launch Rate:																
Rocket A (sELV):	0	0	0	6	9	12	12	12	12	12	12	12	12	12	12	
Rocket B (mELV):	0	0	0	0	2	4	5	5	5	5	5	5	5	5	5	
Pricing:																
Rocket A, Per Launch:	0.00	0.00	0.00	1.60	1.66	1.73	1.80	1.87	1.95	2.02	2.11	2.19	2.28	2.37	2.46	
Rocket B:	0.00	0.00	0.00	2.85	2.96	3.08	3.21	3.33	3.47	3.61	3.75	3.90	4.06	4.22	4.39	
Income Statement:																
Revenues:																
Launch:																
Rocket A:	0.00	0.00	0.00	9.60	14.94	20.77	21.60	22.46	23.36	24.29	25.27	26.28	27.33	28.42	29.56	
Rocket B:	0.00	0.00	0.00	0.00	5.93	12.33	19.24	20.00	20.80	21.64	22.50	23.40	24.34	25.31	26.32	
Total:	0.00	0.00	0.00	9.60	20.86	33.10	40.83	42.47	44.16	45.93	47.77	49.68	51.67	53.73	55.88	
Expenses:																
Expenses, Fixed:																
Labor:	0.00	0.01	0.08	0.28	0.64	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52	
Rent:	0.00	0.00	0.00	1.17	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80		
Maintenance:	0.02	0.60	1.80	2.34	2.72	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02	
Insurance:	0.01	0.24	0.63	0.88	0.86	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42	
Salaries, Bnfts, & B	0.00	0.30	1.18	3.08	5.18	7.40	9.81	10.20	10.61	11.03	11.47	11.93	12.41	12.90	13.42	
Total:	0.04	1.15	3.49	7.76	10.68	13.28	16.21	16.88	17.54	18.24	18.97	19.72	20.51	21.33	22.19	
Depreciation:	0.05	1.07	2.03	4.02	4.44	4.37	4.35	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37	
Total:	0.09	2.22	6.32	11.78	15.04	17.65	20.56	21.25	21.90	22.60	23.33	24.09	24.88	25.70	2	
Earnings Before Int. & Taxes	-0.09	-2.22	-6.32	-2.18	5.87	15.45	20.27	21.23	22.26	23.33	24.43	25.59	26.78	28.03	29.33	
Net Interest:																
Interest Income:	0.03	0.08	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
Interest Expense:	0.07	0.08	2.28	2.92	2.91	2.66	2.61	2.34	2.17	1.96	1.78	1.57	1.34	1.10	0.85	
Total:	-0.04	-0.00	-2.13	-2.74	-2.63	-2.48	-2.33	-2.16	-1.99	-1.80	-1.60	-1.39	-1.16	-0.92	-0.67	
Earnings Before Taxes:	-0.13	-3.02	-8.45	-4.93	3.24	12.96	17.94	19.07	20.27	21.53	22.83	24.20	25.62	27.11	28.66	
Taxes:	0.00	0.00	0.00	0.00	1.31	5.24	7.25	7.70	8.19	8.70	9.22	9.77	10.35	10.95	11.59	
Net Profit:	-0.13	-3.02	-8.45	-4.93	1.93	7.73	10.69	11.37	12.08	12.83	13.61	14.42	15.27	16.16	17.08	

Financial Assumptions

Revised: 13 Jan 93

General Assumptions		Variable Name
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	AP-AvgDays
Avg days in A/R:	0 days	AR-AvgDays

Inflation Assumptions		Variable Name
Inflation Rate:	4%	Inflation
Construction Inflation Rate	8%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions		Variable Name
Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CostEngCost
General Requirements (% of Capital)	5%	CostGenReq
Contractor's Profit & Bonds (% of C	8%	CapContrProfit
Contingencies (% of Capital):	10%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replace (% of Depreciat):	15%	CapRep

	Year 1	Year 2	Year 3	Year 4	Year 5
Building Cost Phasing:	0%	30%	50%	20%	0%
Machinery Cost Phasing:	0%	20%	30%	30%	20%
Engineering Cost Phasing:	30%	30%	20%	20%	0%

Operating Cost Assumptions		Variable Name
Operating Cost Mult (% of Cost):	100%	OpsCostMult
Benefits (% of Salary):	30%	Benefits
Supplies (% of Salary):	8%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hills (Per sf/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	2%	MaintMach

Debt/Equity Assumptions		Variable Name
Leverage (Debt as a % of capital):	50%	Leverage
Long Term interest Rate:	6.5%	InterestLong
Short Term interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	5 yrs	TermShort

Depreciation Assumptions		Variable Name
Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Equip Life (yrs):	7 yrs	DeskEquipLife
Salvage Value:	$0	DeskEquipSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Real year	3 yr	CapRealYr
Status %:	5%	CapRepPct
Life (yrs):	3 yrs	CapRepLife
Salvage Value:	$0	CapRepSalvage

Free Cash Flow Analysis:

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rel.Yrs:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Free Cash Flow:																
EBIT:		-0.09	-2.22	-6.32	-2.18	5.87	15.45	20.27	21.23	22.26	23.33	24.43	25.59	26.78	28.03	29.33
Less Taxes on EBIT:		0.00	0.00	0.00	0.00	-1.31	-5.24	-7.25	-7.70	-8.19	-8.70	-9.22	-9.77	-10.35	-10.95	11.58
Net Op Profit Less Adj Taxes		-0.09	-2.22	-6.32	-2.18	4.56	10.21	13.02	13.53	14.07	14.63	15.21	15.81	16.44	17.08	17.75
Plus Depreciation:		0.05	1.87	2.83	4.02	4.44	4.37	4.35	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37
Gross Cash Flow:		-0.04	-1.15	-3.49	1.84	9.00	14.58	17.37	17.90	18.44	19.00	19.58	20.18	20.80	21.45	22.12
Increase in Working Capital:		1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus Capital Expend:																
Building:		1.18	17.02	26.77	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery:		0.00	4.28	6.83	6.96	4.78	6.00	6.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vehicles:		0.03	0.51	0.86	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Replacement		0.00	0.00	0.21	0.57	0.60	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Capital Cost Mult:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:		1.18	21.78	34.48	20.60	5.58	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Gross Investment:		2.19	22.78	37.48	20.60	5.58	0.89	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Free Cash Flow:		-2.22	-23.93	-40.97	-18.78	3.41	13.70	16.50	17.03	17.57	18.13	18.71	19.31	19.93	20.58	21.24
Cumulative Cash Flow:		-2.22	-26.16	-67.13	-85.89	-82.48	-68.78	-52.28	-35.25	-17.68	0.45	19.16	38.46	58.39	78.96	100.21
Financial Flow:																
Financing Needed:		-2.28	-25.06	-43.98	-22.89	-0.67	9.56	12.31	12.97	13.44	13.94	14.46	14.97	15.52	16.08	16.66
- Convertible Equity:		-1.14	-12.53	-21.99	-11.44	-0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Cash-In Equity:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Increase in Debt:		-1.14	-12.53	-21.99	-11.44	-0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Debt:		1.14	12.53	21.99	11.44	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- A/P Increase:		0.00	0.00	0.18	0.36	0.22	0.22	0.24	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07
- AT Interest Income:		-0.04	-0.12	-0.20	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
+ AT Interest Expense:		0.05	0.58	1.60	1.93	1.85	1.76	1.66	1.55	1.43	1.31	1.18	1.04	0.89	0.73	0.56
+ A/R Decrease:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+ Principle Payments:		0.05	0.57	1.51	2.09	2.24	2.38	2.54	2.70	2.88	3.06	3.26	3.47	3.70	3.94	4.20
+ Dividends:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Financial Flow:		-2.22	-23.93	-40.97	-18.78	3.41	13.70	16.50	17.03	17.57	18.13	18.71	19.31	19.93	20.58	21.24

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rel.Yrs:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation Multiplier:		1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73

Launch Rate:

Rocket A (sELV):	0	0	0	8	8	12	12	12	12	12	12	12	12	12	12
Rocket B (mELV):	0	0	0	0	2	4	5	5	5	5	5	5	5	5	5
Rocket C:	0	0	0	0	0	2	4	5	5	5	5	5	5	5	5

Pricing:

Rocket A, Per Launch:	0.00	0.00	0.00	1.70	1.77	1.84	1.91	1.99	2.07	2.15	2.24	2.33	2.42	2.52	2.62
Rocket B:	0.00	0.00	0.00	3.00	3.12	3.24	3.37	3.51	3.65	3.80	3.95	4.11	4.27	4.44	[illegible]
Rocket C:	0.00	0.00	0.00	3.00	3.12	3.24	3.37	3.51	3.65	3.80	3.95	4.11	4.27	4.44	[illegible]

Income Statement:

Revenues:															
Launch:															
Rocket A:	0.00	0.00	0.00	10.20	15.81	22.06	22.95	23.87	24.82	25.81	26.85	27.92	29.04	30.20	31.40
Rocket B:	0.00	0.00	0.00	0.00	6.24	12.98	16.87	17.55	18.25	18.98	19.74	20.53	21.35	22.20	23.09
Rocket C:	0.00	0.00	0.00	0.00	0.00	6.49	13.50	17.55	18.25	18.98	19.74	20.53	21.35	22.20	23.09
Total:	0.00	0.00	0.00	10.20	22.15	41.53	53.32	58.96	61.32	63.77	66.32	68.98	71.73	74.60	77.59
Expenses:															
Expenses, Fixed:															
Utilities:	0.00	0.01	0.08	0.28	0.54	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52
Rent:	0.00	0.00	0.00	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80
Maintenance:	0.02	0.80	1.60	2.34	2.72	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02
Insurance:	0.01	0.24	0.63	0.68	0.96	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42
Salaries, Bnfts, & G	0.00	0.28	1.11	2.94	4.92	7.06	9.36	9.73	10.12	10.52	10.95	11.38	11.84	12.31	12.81
Total:	0.04	1.14	3.43	7.42	10.36	12.94	15.78	16.39	17.05	17.73	18.44	19.18	19.94	20.74	21[illegible]
Depreciation:	0.05	1.67	2.81	3.95	4.30	4.18	4.12	4.12	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Total:	0.09	2.21	6.25	11.58	14.66	17.11	19.88	20.52	21.16	21.84	22.55	23.29	24.06	24.85	25.68
Earnings Before Int. & Taxes	-0.09	-2.21	-6.25	-1.38	7.49	24.42	33.44	38.44	40.16	41.93	43.77	45.69	47.68	49.75	51.90
Net Interest:															
Interest Income:	0.03	0.08	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Interest Expense:	0.07	0.88	2.37	2.88	2.75	2.61	2.48	2.30	2.12	1.94	1.76	1.54	1.31	1.08	0.83
Total:	-0.04	-0.79	-2.12	-2.71	-2.57	-2.43	-2.28	-2.12	-1.94	-1.76	-1.57	-1.36	-1.13	-0.90	-0.65
Earnings Before Taxes:	-0.13	-3.00	-8.37	-4.09	4.91	21.99	31.16	36.33	38.21	40.17	42.21	44.33	46.54	48.85	51.26
Taxes:	0.00	0.00	0.00	0.00	1.98	8.88	12.59	14.67	15.44	16.23	17.05	17.91	18.80	19.74	20.71
[illegible]	-0.13	-3.00	-8.37	-4.09	2.93	13.11	18.57	21.65	22.77	23.94	25.16	26.42	27.74	29.12	[illegible]

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rel.Yrs:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Free Cash Flow Analysis:

Free Cash Flow:																
EBIT:	-0.09	-2.21	-6.25	-1.38	7.49	24.42	33.44	38.44	40.16	41.93	43.77	45.69	47.68	49.75	51.90
Less Taxes on EBIT:	0.00	0.00	0.00	0.00	-1.98	-8.88	-12.59	-14.67	-15.44	-16.23	-17.05	-17.91	-18.80	-19.74	20.71
Net Op Profit Less Adj Taxe	-0.09	-2.21	-6.25	-1.38	5.50	15.54	20.85	23.77	24.72	25.70	26.72	27.78	28.88	30.02	31.20
Plus Depreciation:	0.05	1.67	2.81	3.95	4.30	4.18	4.12	4.12	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Gross Cash Flow:	-0.04	-1.14	-3.43	2.58	9.81	19.71	24.97	27.89	28.83	29.81	30.83	31.89	32.99	34.13	35.31
Increase In Working Capital:	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Plus Capital Expend:															
Buildings:	1.16	17.02	28.77	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery:	0.00	4.25	6.63	6.90	4.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vehicles:	0.03	0.51	0.88	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Replacemer	0.00	0.00	0.15	0.42	0.59	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Capital Cost Mult:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:	1.19	21.78	36.43	20.45	5.37	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Gross Investment:	2.19	22.78	37.43	20.45	5.37	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Free Cash Flow:	-2.22	-23.92	-40.86	-17.87	4.43	19.07	24.34	27.28	28.22	29.20	30.22	31.27	32.37	33.51	34.69
Cumulative Cash Flow:	-2.22	-26.14	-67.01	-84.88	-80.45	-61.38	-37.04	-9.76	18.46	47.66	77.87	109.14	141.51	175.02	209.71
Financial Flow:															
Financing Needed:	-2.28	-25.04	-43.86	-21.95	0.43	15.03	20.23	23.29	24.17	25.09	26.04	27.02	28.04	29.10	30.19
- Consortium Equity:	-1.14	-12.52	-21.93	-10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Outside Equity:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Increase In Debt:	-1.14	-12.52	-21.93	-10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase In Debt:	1.14	12.52	21.93	10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
- A/P Increase:	0.00	0.00	0.18	0.34	0.23	0.21	0.23	0.05	0.05	0.00	0.00	0.00	0.00	0.00	[illegible]
- AT Interest Income:	-0.04	-0.12	-0.28	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	0.06	0.06	0.06	0.06	0.07	0.07
+ AT Interest Expense:	0.05	0.58	1.50	1.91	1.82	1.72	1.62	1.52	1.40	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
+ A/R Decrease:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	1.15	1.01	0.87	0.71	0.55
+ Principle Payments:	0.05	0.57	1.51	2.08	2.20	2.34	2.49	2.66	2.83	0.00	0.00	0.00	0.00	0.00	0.00
+ Dividends:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	3.21	3.42	3.64	3.87	4.13
Total Financial Flow:	-2.22	-23.92	-40.86	-17.87	4.00	4.63	4.11	3.98	4.04	0.00	0.00	0.00	0.00	0.00	0.00
										4.11	4.18	4.25	4.33	4.41	4.50

ZOLA CHILDS
Councilmember

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

Phone: (808) 961-8266
Fax: (808) 969-3291

October 15, 1993

Mr. Ken Munechika, Executive Director
Office of Space Industry / DBEDT
PO Box 2359
Honolulu, HI 96804

RE: Spaceport EIS Analysis Forum

Dear Ken:

I have been appointed chairman of a Special Committee (a sub-committee) of the Planning Committee of the Hawaii County Council formed for the purpose of reviewing and evaluating the Draft E.I.S. for the "Commercial Satellite Launch Facility" (Spaceport) in our Ka'u district. The sub-committee is charged to recommend to our Planning Committee what public comments, if any, should be made to your agency regarding the E.I.S. contents prior to the November 22 deadline.

In order to perform a meaningful review and evaluation, it is essential that we committee members be able to ask specific questions of some of the consulting specialists who provided the various component studies making up the E.I.S. document. We would like to do so in a public venue, so that the questions and answers can be heard first-hand by whomever is interested in these issues.

Recalling your willingness to provide a more in-depth information session as expressed at the County Council briefing in August, as sub-committee chairman I would like to request your attendance at a special meeting along with the E.I.S. specialists. While it is of course preferable to have the specialists there in person, a telephonic/speakerphone connection with these persons, one by one, at their remote (mainland) office locations may suffice.

Due to the time constraints we are operating under, the special meeting must occur in the last week of October. We would be pleased to schedule this meeting for whichever day and whatever time best suits your needs. We will set a location in either Kona or Hilo depending on when you will be available.

Comm. No. 548.24
File No.
Ref. To: PO Sub Committee
OCT 15 1993

Mr. Ken Munechika
October 15, 1993
Page 2

Dialog at the meeting will be limited to exchanges among councilmembers, yourself, the E.I.S. consultant/technicians and several (3 - 5) invited persons with relevant scientific, managerial, economic and environmental credentials and interests. The general public will be allowed to attend and observe, with any oral comments limited to the end of the meeting, after our discussion are complete, and directed only to the councilmembers.

The committee will concentrate its inquiry to the following general areas:

- air, noise, light, and water/ocean pollution estimates and methodologies used for predictions and monitoring. Impacts on the Volcanoes National Park and Mauna Kea observatories (including radiowave interference concerns) and ocean marine resources are particular areas of interest.
- traffic impact study, including transport vehicle speed issues and lack of addressing any West Hawaii impacts between the site and Keahole Airport.
- studies not included, such as solid waste characterization, control and disposal.
- the feasibility of a fully integrated hazard and pollution mitigation system as implied to be necessary when one combines the various study recommendations, e.g., limiting launches to a proper combination of wind, sea turtle and Mauna Kea observatory conditions: can such mitigation measures realistically be maintained against the economic and/or (federal) governmental pressure to have particular "payloads" deployed quickly?
- the issue of using a launch quality and rate scenario which is apparently infeasible from an economic or investment standpoint as the premise for quantifying and qualifying the various environmental risk areas.
- earthquake impacts on the developed project given the geographic data.
- The human risk assessment study, particularly as to fuel spills and rocket explosions.
- the economic foreclosure issue, i.e., whether the document adequately asse[illegible] the project's impact on the po[illegible]e development of other econo[illegible]ally feasible and desirable altern[illegible]s in this area. In

particular, the impact on lands already zoned for resort and residential development in the vicinity.

- the relative reliability of the concept premise, e.g., (i) the degree of likelihood that changing technologies and national priorities will militate toward a wholely different type of launch vehicle, rate, and fuel type and the generalized range of changed impacts which would result, and (ii) whether a rocket launch facility, compared with other economic development options, is relatively stable or unstable as an employment and public infrastructure commitment base.

As you can see, some of the concerns are addressed to managerial practicalities for a project laboring under the mitigation measures and operational scenarios described in the E.I.S., and evaluating the likelihood and consequences of non-compliance with some of the proposed mitigation actions, particularly when public access to the sophisticated environmental monitoring equipment may be routinely infeasible. Perhaps you can provide us with input from someone having practical experience with conducting operations under the kind of severe environmental constraints proposed as mitigation measures in the E.I.S., or who has performed ongoing monitoring of such mitigation assessment systems for the benefit of the general public over a long term of launch operations.

The committee's mission does not include providing a recommendation pro or con regarding the spaceport - only comments as to the scope and content of the E.I.S. for that project, any deficiencies seen therein, and overall observations or conclusions for full committee consideration.

Because of our state "sunshine law" advance notice requirements, I would appreciate your reply as soon as possible so that we can arrange for an appropriate meeting room facility for this session and publish our meeting schedule with the required six days advance notice.

Please call me at 322-3646 (Kona) or 961-8266 (Council office) with any questions or comments.

Sincerely,

Keola Childs
Councilmember

cc: Takashi Domingo, Planning Committee Chairman
Special Committee Members

12-171

HELENE H. HALE
Councilwoman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

October 15, 1993

MEMORANDUM TO: SPENCER K. SCHUTTE, CHAIR, HAWAII COUNTY COUNCIL

FROM: HELENE H. HALE, COUNCILWOMAN

RE: W. HACHMEISTER LETTERS REGARDING THE PROPOSED SPACEPORT

Please have the attached information from Mr. Hachmeister referred to the proper committee for consideration.

Thank you.

Attachments

HHH/ctd

Comm. No. 548-25
File No.
Ref. To: PC
Ref. Date OCT 18 1993

October 12, 1993

Councilperson
Helen Hale
25 Aupuni St.
Hilo, Hawaii 96720
(808) 961-8225 FAX 969-3291

Dear Helen,

Enclosed you will find a document titled 'Declaration' by William F. Hachmeister. I have tried to cover the points of interest concerning the licensing of the spaceport. Would you distribute this Declaration to the other Council Members.

Further, I suggest a media covered event with OSI and myself discussing the spaceport proposal. Can the County Council assist in providing this kind of broadcast event? If so, I will cooperate fully and willingly. The people of Hawai'i need to have both sides of the issues answered as clearly as possible.

Sincerely,

William F. Hachmeister

William F. Hachmeister
P.O. Box 10267
Hilo, Hawaii 96720
(808) 961-5084

12-172

DECLARATION BY:
William Frederick Hachmeister
P.O. Box 10267
Hilo, Hawai'i 96720

IMPORTANT PUBLIC NOTICE CONCERNING THE SPACEPORT PROPOSAL

"HE WHO IS SILENT IS CONSIDERED AS ASSENTING, WHEN HIS INTEREST IS AT STAKE": the Palima Point spaceport proposal is currently being offered for review to the public. This is your ONLY chance to state your concerns in writing.

LEAVING THE PUBLIC WITHOUT RECOURSE: rule of public disclosure concerning nuclear fueled rockets does not apply to the State draft environment impact statement, since State of Hawai'i's law, Act 172, already prohibits nuclear fuels on launch vehicles. On the contrary the Federal Government does not have to comply with Hawai'i State law. Any Federal agency can use nuclear fuels on rockets or space-probes at any future date. Further, the State does not have an instrument of contract concerning the spaceport operation, launch restraints and constraints, and liabilities. Only a letter of intent from Lockheed Corporation.

NEWLY DEVELOPED "STATE OF THE ART" NUCLEAR PROPULSION (THERMIONIC) ROCKETS: nuclear propulsion rockets do exist! Thermionic performance is by far greater then that of chemical rockets that are contentiously fading into history. Thermionics provide speed and payload lift abilities that are considered important for the planetary expeditions, and are being adapted to the Ballistic Missile Defense projects. QUIETLY purchased from Russia by our government in 1991, the Bush Administration intentionally limited the public's awareness of the purchase, as reported by The Washington Post, Aviation Week and Space Technology, Christian Science Monitor, and The Wall Street Journal.

IRREPARABLE HAZARDS OF NUCLEAR FUELED ROCKETS: a thermionic rocket is capable of vaporizing and releasing considerable amounts of lethal nuclear fuels, or exploding with a force many times greater than that of Hiroshima. A single malfunction could leave the Island of Hawai'i, probably all the Hawaiian Islands uninhabitable for thousands of years. Nuclear rockets carry hundreds of pounds of PLUTONIUM or URANIUM, whereas the bomb that destroyed Hiroshima required only 2.2 pounds of plutonium, in the historical single event that ended world war II, and continues to be a major health hazard to this day.

ETHICAL VIOLATIONS INVOLVING NASA AND NUCLEAR FUELED SPACE-PROBES: "Sometimes it takes a cowboy". in 1989 I enjoined the Christic Institute's litigation to halt the launch of the NASA space shuttle Atlantis that was carrying the nuclear fueled space-probe Galileo. I gave expert testimony that my ex-employer Teledyne had provided faulty flight computers critical to the shuttle system. The Pentagon and Department of Justice had received guilty pleas, and trial convictions of Teledyne procurement executives. Therefore, significant proof was available to the judge hearing our litigation that should have ruled in our favor and halted the NASA mission. However, our motion was denied and the Launch continued. The following year the nuclear fueled space-probe Ulysses went through a similar challenge, and that litigation also failed. Twice the people of Florida were without recourse except to live in fear of a failed launch that was capable of a single event mass destruction greater than that of Hiroshima. Since 1989 Teledyne Relay's has pleaded guilty, fined, and banned from Pentagon contracts.

THE AMERICAN LA... ...ui tacet consentire videtur, ubi tractatur ejus commodo; "He who is silent is considered as assenting, when his interest is at stake".

BEFORE THE SPACEPORT PROPOSAL CAN BE STOPPED A MAJORITY OF THE PUBLIC MUST REACT NEGATIVELY IN WRITING. SEIZE THIS EXTREMELY VALUABLE OPPORTUNITY TO REPLY. DEMAND THE TRUTH AND ANSWERS TO THESE EXTREMELY CRITICAL QUESTIONS.

NEGATIVE LAND VALUES (Land Economics Feb. 1991 v67 n1 p38(7)): Hawai'i must not apply for a spaceport license from the United States Department of Transportation. Once the license is granted, we are without recourse in matters of nuclear material storage and usage. Economic researchers have found that a significant negative effect occurs on the financial value of agricultural land in the proximity of nuclear reactors (foot note (1)). I agree with members of the Hawai'i County Council and their deferring RESOLUTION 182 93 that demands the State withdraw the spaceport proposal.

THE CHOICE IS YOURS: the State of Hawai'i refuses to address these critical nuclear issues, by simply referring these issues to the Federal Environmental Impact Statement which occurs after the issuance of the license. Therefore, we the people have only one opportunity to make our feelings known. Inform your family and friends; respond to this public notice. Your written statement (optional) is also important for decision makers. Respond by mail to me or to:

Office of Environmental Quality Control, 220 South King Street, Suite 400, Honolulu, Hawaii, 96813.

My signature supports and demands the withdrawal of the spaceport proposal:

NAME	SOCIAL SECURITY	ADDRESS	TELEPHONE

SIGNATURE _____

SIGNATURE _____

SIGNATURE _____

TIME IS OF THE ESSENCE: carefully consider the facts, and discuss these issues with your family and friends. If you feel the same as I and others do then your reply must be mailed immediately. Further, I suggest you xerox this form for others to respond. We must have the majority of the population to make a difference.

Mahalo Nui Loa,

William F. Hachmeister

William Frederick Hachmeister
(ex System Sustain Engineer for Teledyne MicroElectronics on the NASA space shuttle and unmanned launch vehicles).

961-5084

12-173

HELENE H. HALE
Councilwoman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

October 18, 1993

MEMORANDUM TO: ALL MEMBERS HAWAII COUNTY COUNCIL

FROM: HELENE H. HALE, COUNCILWOMAN

RE: ATTACHED ARTICLE

The attached article was from Pacific Business News, October 11, 1993. Are we going to continue to be a part of this farce?

HHH/ctd

Comm. No. 549 26
File No.
Ref. To: PC
Ref. Date OCT 21 1993

Robert M. Rees

The Spaceport: Launch pad for deception

Our government seem to have adopted the gimmickry of paid public relations as a substitute for informed public discussion. It's not too late, however, to try a different approach with regard to the euphemistically named "spaceport," the proposed Big Island facility for commercial rocket launchings. That different approach is to launch a new and improved vehicle — the whole truth.

A recent letter to the editor of one of our newspapers addressed the spaceport and got it right: "If the state is serious about developing technologically advanced projects, it has to ... stop treating its citizens like a bunch of idiots."

The Office of Space Industry (OSI) is part of the Department of Business, Economic Development & Tourism. In the six years of its existence, OSI has spent $7 million promoting a missile launching site at Palima Point in Ka'u. (These funds, according to the authoritative newsletter "Environment Hawaii," include a fee of $486,000 paid to Ret. Adm. Thomas Hayward for his lobbying of Lockheed Missiles & Space to build the facility.)

Eager for favorable publicity, Gov. John Waihee in May prematurely announced the effort had paid off and Lockheed had agreed to cooperate on the project. (Lockheed has yet to agree to any investments and felt the need to issue a clarification after Waihee's announcement.)

DBEDT meanwhile has released an environmental impact statement. Violating its agreement with the Legislature, DBEDT decided not to follow the federal standards for such a study. "This decision," said a DBEDT spokesman, "is based on local considerations and issues that require timely release ... ." The Big Island's "Ka'u Landing" newspaper, reporting on the EIS, cited the health risks and the environmental dangers that accompany a steady diet of rocket launchings.

And, it turns out the economic benefits of a spaceport were overstated by its early promoters. In 1987, when the project was backed by C. Brewer & Co. Ltd., and when current DBEDT Director Mufi Hannemann was hired by "Doc" Bowers to sell the idea to the Big Island, there was talk of 10,000 jobs. Now the state anticipates a workforce of maybe 200. (It's difficult to tell because DBEDT's slick "Conceptual Plan" assumes three or four missiles are being launched at all times in what is described as "full buildout".)

Green Party activists noted "nearly all the permanent jobs created by this rocket facility would go to off-island scientists and technicians, not local residents." DBEDT itself said about half the workforce will be "transient."

True to form, DBEDT at first attempted to keep to itself a financial study which showed that under even optimistic assumptions no financial gains are possible until the next century. Big Island Sen. Andy Levin said, "Frankly, I'm surprised at how small the potential economic benefit ... is compared to the agony that will be caused by trying to get this project through ... ."

Now, what adds Hawaii's unique locoy-rooms touch to all this is that even as it's happening one of Hawaii's few existing high-tech firms, Intelect Inc., is completing the process of reducing its staff by over 100 while transferring workers to Texas. One reason for this reduction: The state said it lacks the funds to do a study on whether to help an existing high-tech company stay in business.

In short, we are paying millions to lure someone to launch Atlas missiles from Palima Point while refusing even to consider whether an existing and environmentally clean business deserves state investment.

The cause of this is our government's chronic emotional problem of defending all it has ever done as perfect. The state now seeks only to justify its $7 million effort on behalf of a spaceport. It's unlikely that DBEDT, whose director is in a state of perpetual campaigning for office and who has been involved one way or another with trying to sell the plan since 1987, will announce it was a mistake.

[illegible]

12-174

October 19, 1993

Chairman Schutte
25 Aupuni St.
Hilo, HI 96720

Dear Chariman Schutte,

This article from the Maimi Herald points out the stupidity of a commercial spaceport. It would be wise for the County Council to take a position on this issue before it is too late.

Aloha,

Jay Hanson

78-662 Alii Drive

Kailua-Kona, HI 96740

Comm. No. 548.27
File No.
Ref. To: R
Ref. Date OCT 21 199

FLORIDA

Flying on the wings of excess

Aviation firm transforms plane into a palatial parlor

By PHIL GIG
Associated Press

[illegible]

Clutch of craftsman

Although using facilities [illegible] Page Avjet as the company that services planes big and small at hundreds of airports across the country. Few stay longer or do more [illegible] craftsmen in Central Florida.

From grand pianos and fountains to video games and full-size kitchens, workers at Page Avjet's airline maintenance and modification have designed, built and installed it all.

They are no exception when [illegible] They're good at [illegible] providing high-altitude creature comforts they are accustomed [illegible] Chandeliers are a [illegible] Satellite [illegible] and [illegible] ready bedroom and spacious showers with gold plated [illegible] doors.

And if [illegible] Jordan [illegible] will probably make the [illegible] through.

'Respect excellence'

So far, it's the only airline [illegible] this [illegible] Page Avjet [illegible] 53-year old business [illegible] said.

If you like these things, he said, Page Avjet [illegible]

CATERING TO COMFORT: H.O. Thomas, a blueprint worker, customizes an airplane at Page Avjet.

Ivan Lewis / Associated Press

MADE TO A WHIM: The interior of a customized jet is luxury unlimited.

Ivan Lewis / Associated Press

made of walnut inlaid with gold. For King Hussein of Jordan, Page Avjet did the interior of a full size jet and installed a mobile communications and command center.

Airlines and other Page Avjet customers have come to another conclusion. When that happens, planes get new seating, paint jobs, delivered [illegible] equipment.

"Southern is always that [illegible] personal business and there's [illegible]

[illegible] commercial airplanes and outfitting 60 to 65 smaller corporate or head of state planes. Nearly all will be jets.

Quality and attention

"A lot of my business with the [illegible]

Spaceport Florida may be grounded

When former Gov. Bob Martinez announced plans for Spaceport Florida in 1989, it was billed as a state-owned way to boost billions [illegible] for space related [illegible] creating [illegible] paying [illegible]

Martinez's [illegible] was known [illegible] $18 million from the Legislature. He got $1.9 million in [illegible] and authority to sell Florida [illegible] bonds. The agency was [illegible] become self-supporting [illegible]

The big plans have [illegible] suspected Florida [illegible] Senator T.K. Wetherell [illegible] Wetherell told The Orlando Sentinel. "Spaceport doesn't have the political clout in Congress. That's the way it is, I'm sorry."

CAPE CANAVERAL — (AP) — Spaceport Florida, touted as a profitable "gateway to the stars" when announced, [illegible] 48, is on such deep financial [illegible] it could be grounded permanently.

Executive Director Ed O'Connor, who earns $97,500 a year, said the agency could be [illegible] $18 million from the Legislature. He got $1.9 million in [illegible] and authority to sell Florida [illegible] bonds. The agency was [illegible] become self-supporting [illegible]

The big plans have [illegible] suspected Florida [illegible] Senator T.K. Wetherell [illegible] Wetherell told The Orlando Sentinel. "Spaceport doesn't have the political clout in Congress. That's the way it is, I'm sorry."

"We've cut teachers, we've cut social workers, we've cut [illegible] jobs," Wetherell said. The Orlando Sentinel. "Spaceport doesn't have the political clout in Congress. That's the way it is, I'm sorry."

The $99 Crime Fighting Package

Our Gold System Includes:

24 Hour 10 Monitoring Systems

Free Home Control

12-175

Stephen K. Yamashiro
Mayor

Harry Kim
Administrator

Bruce D. Butts
Assistant Administrator

County of Hawaii

CIVIL DEFENSE AGENCY
920 Ulaimoi Street • Hilo, Hawaii 96720
(808) 935-0031 • Fax (808) 935-6460

TO: William K. Childs, Councilman

doc08390

FROM: Harry Kim, Administrator H. Kim

DATE: October 28, 1993

SUBJECT: State Draft EIS for Commercial Satellite Launching Facility

GENERAL QUESTION AREAS

1. Extremely Hazardous Material
   The County of Hawaii Civil Defense Agency is in part responsible for the coordination of emergency responders during a hazardous materials incident. The draft EIS does refer to general impact of hazardous materials but falls short in detailing effects, response, and scenarios in dealing with chemicals classified as extremely hazardous material. Civil Defense would require that worse-case scenario be developed by the industry prior to commencement of any operations.

2. Natural Hazards
   There are few places on the Island of Hawaii that would match the number or degree of risk to any facility than the one chosen by this project. The draft EIS refers to lava flows and earthquakes but fails to refer to hazard of tropical cyclones and its effects on surf, surge, wind, and rain.

   What must be emphasized here is the critical need for this project to understand the risk factor to the project, and the full consequences of various scenarios by natural hazards that will impact that area in the projected life of the project.

3. Areas of Specific Concerns
   a. Statements made on mitigation capabilities from adverse effects of incidents through design and/or response capabilities. Seriously questioning emergency-response capabilities as stated

   b. Scenarios detailing effects to total community due to hazardous materials incidents (short-term, long-term) must be pursued and elaborated.

   c. Questioning conclusions made on effects of extremely hazardous material, such as the "most sensitive individuals . . . would not be subjected to severe effects."

dy

Comm. No. 548.29
File No. 5-2-
Ref. To: Sub Com. Draft EIS
Ref. Date OCT 29 1993

October 19, 1993
Mountain View, HI

To: Governor of Hawai'i
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hi 96813

From: Don Rogers
18-4169 Keno St.
Box 1105
Mountain View, HI 96771

Subject: Draft Environmental Impact Statement titled "Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point, Ka'u, Hawaii".

Dear People:

I am a retired Engineer from the University of California at Berkeley, who was involved in research with that institution for thirty years. I moved to Hilo in January of 1989, and built a home for myself here in Mountain View a year later. I am very pro technology, for instance I think that Geothermal power generation is an excellent idea.

I was asked to read the EIS because of my engineering background, and had no opinion on the subject before doing so. After having read it, I can see no reason to spend any more money on this project, and lots of reasons not to. The risks from transporting very toxic and hazardous materials (such as hydrazine and nitrogen tetroxide) through highly populated areas like Hilo are simply unacceptable.

The very large and heavy trucks would destroy highway 11 in a very short time. Some of these trucks mentioned in the EIS are twice as long and twice as heavy as the largest trucks currently allowed on the highways of California. If these trucks are allowed on highway 11, it will look like a washboard in a very short time. A large part of highway 11 is 5 to 6% grade. How will cars be able to get around these trucks when they are traveling five miles per hour and are sixteen feet wide.

When I started to work for the University of California, their computer occupied a building a block square by two stories high. That computer had less computing power and was less reliable than a $15 hand held calculator of today. The reason for that incredible reduction in size, is the invention of the Integrated Circuit. Well I ran the integrated circuits lab at UC Berkeley at the time I retired, and I can tell you there has been a similar reduction in the size of integrated circuits since this space port was originally proposed. In the last seven years there has been a ten thousand to one increase in the amount of information an integrated circuit can contain. That means that the satellites that are being designed today can be much smaller, and do not need ground based launching facilities. They can easily be launched from the belly of a high flying plane at one tenth the cost. This rocket launch facility is obsolete. There is no need for it at all.

Comm. No. 548.28

There are areas along highway 11 (like the one I live in) with only one road in or out. What is your evacuation plan for Paradise Park Mountain View Manor? This development has only one access, North Oshiro Road, and the entire community of potentially several thousand, is all within one kilometer of the intersection of Oshiro Road and highway 11. If there were a spill at that intersection, I would like to know how you could evacuate us.

There are many more reasons not to do this project, but they have been enumerated by others, and I will not bore you by repeating them.

I am glad to see that someone is thinking about this part of the state, but wish that the money that has been spent on this project could have been spent on projects that would benefit the state more. The money this project will cost, if built, could create ten times as many jobs if spent more wisely. The main reason this Island is so poor, is that we import nearly all our consumables. We need to produce more of our food and products here. This island could easily feed the whole state. We need factories and farms, not rocket launch facilities. And please lets have these farms and factories be locally owned, so that the profit from them stays here, and is re-circulated within the state, and not taken back to the mainland, or worse yet, some foreign country.

Sincerely,

Don Rogers
(808)968-8776

Comments on Spaceport DEIS

I. Internal Inconsistencies

The document relies on the work of a number of subconsultants. The subconsultants do not always share the same assumptions about the operation of the proposed facility. This results in a document that leaves the reader perplexed as to which projections are more accurate and which to believe. I cite below several examples:

a. Launch frequency, failure predictions and calculated health risks

(Questions to be addressed to ACTA and Risk Science Associates)

In Volume 6, Appendix A ("Human Health Risk Assessment"), page 6-2, the statement is made: "In this assessment it is assumed that one conflagration event occurs per 70-year lifetime and that total dispersion of emitted substances occurs within one hour." On the next page, the study states that it assumes an identical frequency rate and dispersion model for deflagration events. On the basis of these assumptions, hazard and cancer risk analyses are conducted for the populations presumed to be exposed to chemicals released during these events.

Volume 6, Appendix D ("Impacts of Toxic Spills, Exhaust Gases and Vehicle Accident Gases"), page 4-24, provides a discussion of the history of launch failures for Atlas and Delta vehicles. There it is stated, "Assuming 5 or 6 launches per year from the proposed Hawaiian spaceport, it would not be unreasonable to expect several conflagration type vehicle failures over a 15-year period." (This assumed launch rate is in keeping with launch rate statements elsewhere in the DEIS.)

I question, then, the basis for the statement in the health risk assessment that just one conflagration and one deflagration are expected in a 70-year period. I suggest that the health risk assessment must be redone so that the predicted health effects are more in keeping with the projected launch failure rates.

Second, I would suggest that the impact study be revised to include some discussion of the deflagration frequencies and predicted occurrences at the space launch facility. Otherwise, there is no basis for the one-in-70-years assumption for the deflagration frequency rate.

Comm. No. 548.30
File No. SA
Ref. To: Sub Com on Draft EIS
Ref. Date OCT 29 1993

b. Accidental spill scenarios

(Questions to Risk Science Associates)

I refer again to Volume 8, Appendix A ("Human Health Risk Assessment"). The calculations of health risks are based upon assumptions that do not agree with the set of assumptions used in the study on which the risk assessment is based -- that is, Volume VI, Appendix A ("Risk Analysis for the Transportation of Propellants from Hilo to Palima Point").

In the frontispiece to the risk assessment, there is an acknowledgement that adjustments have been made in the case of two of the assumptions (that dealing with pool depth and the number of containers of hypergolic fuel that would be ruptured in a spill). (Readers are informed that "the analysis is not affected by these changes." I would be more confident if the study were revised so that the changes in assumptions would be contained in the report itself, rather than merely in a prefatory comment.)

There is, however, another area of disagreement between the risk assessment and the risk analysis on which it is based. This concerns the duration of the spill. On page 6-5 of the health risk assessment, the report states that "a pool blanketing time of 15 minutes" was assumed.

Preparers of the ACTA report were instructed to "select events that will produce the highest risk and community impact." In keeping with this, it provided scenarios that were based on a 30-minute blanketing time "for all container spills." "In addition, the risk assessment states, "a pool blanketing time of 15 minutes was used to determine the concentration levels associated with accidental spills of a 55-gallon N_2O_4 container" -- I believe this is a mistake, and it should read: $N_2\underline{H}_4$ -- "and a 300-gallon N_2O_4 cylinder." As further indicated in accompanying tables indicating 60-minute mean concentrations associated with the various spill scenarios, the 15-minute spill scenario is clearly *not* the one that produces "the highest risk and community impact."

On what basis, therefore, does the health risk assessment choose to base its calculations on the 15-minute spill scenario as opposed to the 30-minute scenario?

II. Insufficient Information

Frequently the DEIS makes assumptions that are based upon inadequate information. At times this is explicitly stated (as in the discussion of the potential impacts of toxic spills upon endangered flora and fauna). I will not address acknowledged

insufficiencies, but will limit my comments to those that are not acknowledged.

a. Health effects of exposure to hydrazines and nitrogen tetroxide

(Question for ACTA)

Given that the purpose of any environmental impact statement is to disclose a project's potential effects, I believe that at some point the DEIS for the space launch facility should include prominently a description of the health effects resulting from human exposure to nitrogen tetroxide and to the various hydrazines to be used as propellants in the Delta and Atlas launch vehicles. Rather than being a part of the text, however, the cursory descriptions of the health effects of chemicals of concern are buried in an appendix to the health risk assessment.

Moreover, the sufficiency of the descriptions is questionable. I believe they tend to understate the life-threatening risks that can accompany inhalation of air that contains even minute quantities of hydrazines and nitrogen tetroxide.

I would suggest including as an appendix to the health risk assessment a study that describes these effects. One such study is "Clinical Manifestations of Exposure to Nitrogen Tetroxide and Hydrazine Propellants," by Col. Bruce J. Poitrast and Col. Karen A. Meier, both officers with the U.S. Air Force. (This study was published in the *Medical Bulletin of the U.S. Army Medical Department*, February 1988.) I attach a complete copy to my comments. I believe their report provides in a form more direct and accessible than anything in the DEIS a summary of the health effects of these chemicals.

In addition, the Poitrast and Meier report includes a discussion of the health effects resulting from exposure to a breakdown product of UDMH (unsymmetrical dimethylhydrazine): "UDMH is a respiratory irritant and a convulsant. In high concentrations, it can cause pulmonary edema. UDMH is also a carcinogen suspect.

"When UDMH vapors are exposed to air, an oxidation process occurs producing varying quantities of NDMA [N-nitrosodimethylamine]. It is highly toxic in animals and man. Routes of entry are inhalatino and possibly percutaneous absorption. Systemically, NDMA poisoning causes nausea, vomiting, abdominal cramps and diarrhea.... Human cases have been reported to show sevre liver damage. One autopsy revealed acute diffuse centrolobular necrosis of the liver. NDMA is a highly potent carcinogen in several animal species, producing malignant tumors

of the liver, kidney, and lung. *To date, a safe exposure standard has not been established. Therefore, all contact with NDMA should be avoided. Exposure to NDMA must always be considered when working with UDMH.*" (Emphasis added.)

The discussion in the DEIS (at Volume 6, Appendix A, pages A-23-25) of the harmful properties of NDMA (or DMNA, as it is alternately referred to) differs substantially from that in Poitrast and Meier. As though to minimize the concern, the DEIS states that DMNA "is also present in a variety of foods including cheeses, soybean oil, canned fruit, meat products, fish products and alcoholic beverages. Concentrations in these foodstuffs have been measured to be 0 [sic] - 85 µg/kg."

It is, of course, nonsense to talk about something being found at 0 concentration. More important, however, is the fact that these concentrations are not put into perspective. The microgram-per-kilogram measure represents a concentration in the range of parts per billion units weight. The DEIS provides no way of translating this concentration by weight into the equivalent concentration by volume that it represents. In other words, if I eat a piece of cheese (containing presumably more than the 0 micrograms/kilogram concentration of DMNA), what is the equivalent exposure if I inhale air with some fraction of DMNA? The DEIS states that "the average daily intake of DMNA has been estimated to be 0.006-0.012 µg from water and 0.002 µg from air

The DEIS should provide a frame of reference so that the reader will be able to figure out just how much larger the possible exposure to DMNA will be as a result of being in close proximity to DMNA as a result of a spill or other accident involving UDMH. Otherwise, it seems to me that the references to food containing DMNA serve only to suggest somehow that DMNA is a relatively benign substance.

b. Use of 60-minute mean concentrations

(Question for ACTA, Risk Science Associates)

The practice of averaging concentrations over a 60-minute period -- thereby "diluting" them -- needs to be justified. If initial exposures are high enough to cause severe injury (and, according to ACTA, they could be so high), the exposed populati will not live out the hour over which the "mean" exposure occur

I am well aware of the use of such averages in calculating exposure guidelines. However, the utility of these averages diminishes as concentrations increase. When one gets to the extremely high concentrations anticipated in the scenarios discussed above, the use of 60-minute mean concentrations needs to be just d.

c. **Hazmat Team response time**

(Question for Risk Science Associates, OSI)

In discussions of spill scenarios, the DEIS states that the risks will be minimized by the presence of a hazard materials response team that will accompany all fuel shipments. Work-safety requirements call for members of these hazmat teams to be properly attired before attending to spill clean-up so that they will themselves not succumb to the effects of exposure.

In spills involving nitrogen tetroxide and hydrazine fuels, the proper attire is quite elaborate indeed, calling for, among other things, self-contained breathing apparatus, impermeable cover-all suits, masks, and the like. At no point in the DEIS is there any discussion of the time that a response team will require to suit up and begin the clean-up work.

It is my contention that the 15-minute spill scenario used in the report on human health risks is dramatically *understated*, in light of the insufficient information on hazmat team response time. I believe that the DEIS should include a discussion of the way in which this hazard response team would operate (containing, among other things, a realistic description of the time required for it to suit up). Absent such a discussion, the DEIS is not justified in assuming that a spill can be cleaned up in either 15 minutes or 30 minutes.

III. **Questionable Assumptions**

a. **Rupture of only one container in spill**

(Question for ACTA)

The basis for calculating all of the accidental spill scenarios is the assumption that only one container will rupture. This assumption needs to be explained.

It would seem that the DEIS would have readers believe that the strength of the containers and the unlikelihood of an accident are supportive of the assumption that only one container (among several included in a shipment) will rupture.

This is not so. One might just as easily argue that, given the strength of the containers, if an accident causes an impact sufficient to cause one of them to rupture, it could just as easily cause the rupture of two or more containers.

b. **Single-chemical involvement in on-site spill**

(Question for ACTA, Risk Science Associates)

In the Human Health Risk Assessment (Volume VIII, Appendix A, Page 6-4), the statement is made: "Assumptions made in the evaluation of the [on-site] spill scenarios ... include instantaneous release (15 seconds or less) of a single chemical to minimize the likelihood of an explosive reaction and maximize the resulting pool and subsequent total mass evaporation rate."

Should there not be a description of what would happen if there *was* an explosive reaction (that is, what would happen if a spill occurred that involved an oxidizer and an oxidant)? Again, if there is some event that causes the rupture of one storage facility or on-pad tank, is it not reasonable to think that others subjected to the same event (say, an earthquake) may rupture?

What would happen if the storage tanks for nitrogen tetroxide and hydrazine were to spill on-site at the same time and cause an explosion? Is this scenario too far-fetched to consider? If so, this needs to be explained.

IV. **Erroneous Information**

a. **Highway 11 at Kea'au**

(Question for ACTA, OSI)

The DEIS selects sites for study of the impacts of accidental spills in transit based on certain criteria, includin where lane mergers. One site in the Kea'au area is selected for study, on the basis of it being the point where the highway shrinks from four lanes to two.

Actually, the point where the shift from four to two lanes occurs is more than a mile distant from the point selected for study. This results in a far different potential impact. The DE should be corrected to reflect the on-the-ground situation.

b. **Misstatement of exposure risk**

(Question for OSI)

In Volume I, at page 5-42, the statement is made that the isopleth contours "reflect areas where mild effects could occur to the most sensitive groups."

This ot true. The contours sho eas where short-term

public exposure guidelines are *exceeded*. It is conceivable that on the fringes of the contours, where concentrations are just slightly above SPEGLs, more sensitive people might experience effects that more robust people would not experience.

Later, the DEIS would seem to contradict this assertion. On page 5-48, for example, one finds the statement: "[T]he 'Immediately Dangerous to Life and Health' (IDLH) level of 50 ppm for nitrogen tetroxide would be exceeded at distances up to 100 to 120 meters (330 to 396 feet) from the spill site... [P]ersons within 20 meters (66 feet) ... could suffer severe adverse health effects, even if the toxic hazard spill emergency response team following the transportation truck is able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it."

V. Irrelevant or Misleading Information

a. Comparisons with chlorine transport

(Questions for OSI, ACTA, Risk Science Associates)

In Volume I of the DEIS as well as in the Health Risk Assessment and the Risk Analysis for Transportation of Propellants, the comparison is made between the risks of transporting substances such as hydrazine and nitrogen tetroxide with those involved in the transport of chlorine.

For example, Volume VI, Appendix A contains a map depicting the 1-hour SPEGL isopleth from a spill of chlorine (Figure 4-75, page 4-89). To a casual reader, the size of the area covered (that is, the area on the page that is shaded), while smaller than the shaded areas on maps for spills of hydrazine and nitrogen tetroxide, appears to be roughly comparable in size. It takes a close reader to notice that the map for the chlorine isopleth is drawn to a scale (1" = 800') that is far larger than the scale (1" = 2000') used to depict the isopleth for hydrazine and nitrogen tetroxide.

If comparisons are to be made, then the map scales must be the same. As presented, the DEIS verges on dishonesty by using such vastly different scales to indicate areas that would be engulfed by spills of these substances.

According to the Transport Risk Assessment (Volume 6, Appendix A, page 1-2), "The purpose of this analysis [of chlorine spills] was to compare the risk from transporting rocket fuels with that associated with the transportation of chlorine. Chlorine is used and transported throughout Hawai'i and so it can reasonably be assumed that the associated transportation related risk is tacitly accepted by the local population."

Setting aside for the moment the incomparability of health risk (that of exposure to rocket fuels being far greater than that of exposure to chlorine), the statement just quoted is not something that I believe should be accepted at face value. Many people accept the risk of chlorine transport knowing that there is a public benefit accompanying such risk (i.e., cleaner drinking water and, through the use of chlorine at sewage treatment plants, cleaner near-shore water). In the eyes of many people in Hawai'i, there is no public benefit associated with the transport of rocket propellants. (For more on this, see Volume 5, Appendix C, "Sociocultural Impacts," as well as many articles in the local media indicating a lack of popular support for a space launch facility.) To surmise that, because the public accepts risks associated with chlorine transport, it will also accept risks associated with rocket propellant transport is, I submit, a totally unjustified -- and unsupportable -- leap of spurious logic.

For these reasons, I believe that the all discussion and maps concerning the risk of chlorine -- which will *not* be transported as part of the spaceport operations -- should be stricken from the final EIS. As things stand, the discussion of chlorine and what is purported to be the public's "tacit" acceptance of associated risks smack of advocacy and apology rather than disclosure.

b. Minimization of health risk

(Question for Risk Science Associates)

On page 13-8 of "Human Health Risk Assessment" (Volume 6, Appendix A), the statement is made that, "The maximum hazard index projected to occur due to a transporation spill of hydrazine, 340, occurs at Location 1, Hilo Harbor... Maximum acute hazard index due to a transportation spill of N_2O_4 -- 510 - occurs at Location 1 during daytime conditions....Airborne concentrations of spilled hydrazine and N_2O_4 only fall below their 1-hour acceptable exposure levels at distance greater than 600-1000 meters from the spill site. There, a significant hazard exists for adverse health effects -- however mild or transitory (e.g., respiratory irritation) -- to occur to persons living, working, playing or traveling through an area of significant size near a spill site."

In light of the Poitrast and Meier study, as well as others too numerous to mention, I take exception to the characterization of effects as possibly "mild or transitory (e.g., respiratory irritation)." As shown in the passages quoted above, even moderate ex[illegible]ure may result in symptoms [illegible]quiring treatment fo[illegible]

up to two months. At the concentrations predicted to occur in the ACTA spill scenarios, someone standing 20 meters from a spill of nitrogen tetroxide would be exposed to concentrations of 748 parts per million (assuming a 15-minute pool time, and averaging the concentration of chemical released during that 15-minute period out over one hour). If the 30-minute pool time is assumed, the ACTA study indicates the 60-minute mean exposure would be 1,434 ppm. (It is appropriate, in this connection, to note that the short-term public exposure guideline level for nitrogen tetroxide is 0.12 ppm.) Concentrations for the period of time it takes to clean up the spill would be many times higher than these 60-minute averages.

VI. Questionable Methodology

a. Spill Scenarios

(Question for ACTA, OSI)

The methodology employed in the development of the spill scenarios has resulted in a study that leads the reader to believe that the wind will carry the plume in just two directions (one for daytime spills, and one for night-time spills). As a glance at a wind rose will show, breezes in Hawai`i can blow in all directions over the course of a year.

The maps showing the isopleths would be helped by the addition of a wind rose to show the frequency of wind directions in the areas depicted. This will alert the reader that the shaded areas depict the area that will be engulfed by high concentrations of toxic substances are only two of many possible scenarios. For example, in Hilo, at the intersection of Highway 11 and Kalanianaole Avenue, winds blow from the south about 15 percent of the time. Should a spill occur when winds are from this direction, the plume would engulf the hotels along Banyan Drive. The general failure of the plume maps to indicate the wide range of wind directions tends to suggest to readers and reviewers that the plumes will go in just the two directions indicated.

One might reasonably argue that this methodology does not depict worst-case scenarios -- or even reasonable worst-case scenarios -- for spills. Rather, its use simply is a convenience, having no logical relationship to a worst-case at all.

OFFICE OF HAWAIIAN AFFAIRS

Ho'oku'ikāhi

688 Kinoole Street, Suite 104-A
Hilo, Hawaii 96720

933-4496/933-4349/933-4743
Fax No. 933-4744

DATE: OCTOBER 27, 1993

TIME:

TO: COUNCILMEMBERS FAX NO.: 969-3291

COMPANY: HAWAII COUNTY COUNCIL

FROM: MOANIKEALA AKAKA, HAWAII ISLAND TRUSTEE

SUBJECT: PRESS RELEASE

INFORMATION(S):

Number of pages including this cover page are 3. Please call any of the above numbers if you do not receive the number of pages indicated.

Comm. No. 548
File No. SAT
Ref. To: -
Ref. Date NOV. 3 1993

PRESS RELEASE

October 27, 1993

Contact: Moanikeala Akaka
Hawaii Island Trustee
Office of Hawaiian Affairs
933-4349 or 935-7981

We are witnessing, hopefully, the death-throws of the Ka'u Space Port "pipe-dream" that the State Administration has been advocating for Hawaii island for over a decade.

Deke Slayton, ex-astronaut at a public forum in the early 80's attended by over 400 in Na'alehu, Ka'u in response to my question said, "If the people in Ka'u don't want space port--------it will not happen!" For years opposition has been growing from residents of the Big Island as well as from our past two Mayors. Now Lieutenant-Governor Ben Cayetano has spoken out against a spaceport that has already cost taxpayers of this state $7 million. If this project succeeded, it would have cost us several hundred millions of dollars more in infrastructure--plus costs to a space developer foolish enough to build, four hundred millions of dollars more to set up this project.

Lockheed has struck a "mortal blow" to the proposed spaceport by pulling out of <u>any</u> interest in pursuing this project. Their agent retiree Navy Admiral Thomas Hayward is leaving as Space-Czar for the state at a past annual income of $120,000 paid by Hawaii residents. Hayward had a conflict of interest because he was also a Lockheed employee.

For all these years we in the community have continuously pointed out the environmental and cultural concerns of this venture: its location on a volcanic fault zone; proximity of a few miles from residential Pahala; an insufficient Environmental Impact Statement is still to be completed. Meanwhile the Governor still refuses to admit that the spaceport is a dead issue--lacking only an obituary.

The Spaceport is dead and as Hawaii Island OHA Trustee I feel we must ask ourselves if the expended $7 million would not have been better spent on experimental agricultural projects, community-based economic development projects, (as recommended by Ka'u Councilwoman Keiko Bonk-Abramson of the Green Party), as well as environmentally-sound, appropriate technology small business ventures? Would we not be much farther ahead?

Ua Mau Ke Ea O Ka 'Aina I Ka Pono.

Moanikeala Akaka

Moanikeala Akaka, Trustee
Office of Hawaiian Affairs
Hawaii Island

MIKE FLOYD P.O. BOX 981, pahala, hi 96777 NOV. 1, 1993

ALOHA,

MY NAME IS MIKE FLOYD, MY FAMILY LIVES IN KAU JUST A FEW MILES FROM THE SPACEPORT SITES.

FROM THE HA OF ALOHA , I WANT THE BREATH OF LIFE THROUGH ME TO SAY IN 3 MINUTES TOO IMPORTANT SPACEPORT DAMAGES TO THE COUNTY OF HAWAII. THE INSANITY TO DESTROY LIFE FOR THOUSANDS OF YEARS FOR THOUSANDS OF PEOPLE IS MUCH WORSE THAN GENOCIDE, YOUR CONSCIENCES MUST KNOW THIS FROM NAGASAKI ALREADY. TOURISM CAN BE ECO FRIENDLY BUT NUCLEAR POISION OF WHATEVER TYPE THAT MAY COME FROM A SPACEPORT IS A THOUSAND TIMES MORE DAMAGING THAN A GOLF COURSE.

MY SECOND POINT IS THAT THE SPACEPORT IS VERY UNPOPULAR IN MY OHANA AND OTHERS. 18,000 MEMBERS OF KALAHUI ARE COMPLETELY AGAINST THE SPACEPORT . IAM VERY MUCH AFRAID OF THE BILLIONS OF DOLLARS LIABILITY OF THIS COUNTY AND COUNTY COUNCIL FOR INCALCULABLE DAMAGES TO HAWAIIANS THAT WOULD NEED TO BE PAID WHEN THE SOVEREIGNTY PROCESS IS COMPLETED IN THE NEXT YEAR.

LAST WEEK U.S. SENATOR GORTON SAID "HAWAIIAN INDEPENDENCE IS COMING. WE SHOULD NO LONGER " GIVE THINGS TO HAWAIIANS THAT THEY DONOT WANT. HAWAIIANS ARE GUARANTEED BY ARTICLE 73 OF THE UNITED NATIONS CHARTER TO HAVE A FREE VOTE FOR OR AGAINST INDEPENDENCE , IT MAYBE SLOW BUT IT IS COMING.

BE AKA MAI! REDUCE SPACEPORT TENSIONS IN OUR LIVES IN KAU, AND IN YOUR LIVES, OUR CHILDRENS LIVES. BE AKAMAI! STRONGLY OPPOSE COMPLETION OF THE EIS, SO THAT ANOTHER COMPANY CANNOT SNEAK UNDER A PILE OF PALA PALA INTO KAU, OR ANOTHER ISLAND. FOR ONCE BE REAL PUBLIC SERVANTS FOR THE INDIGENOUS PEOPLE. DONOT ALLOW IMPERIALIST GREED TO PUT THIS SCAR ON THE AINA FROM WHICH OUR BELOVED ALOHA COMES.

548.32

Presented [illegible]

Honolulu Star-Bulletin

THURSDAY, OCTOBER 28, 1993 THE PULSE OF PARADISE

QUOTABLE

U.S. Senator Slade Gordon (R-Wash) on a resolution apologizing to native Hawaiians for the U.S. role in the overthrow of the monarchy: "I'm afraid the logical consequence of this resolution is INDEPENDENCE FOR THE HAWAIIAN KINGDOM."

OHA counsels on Senate apology for overthrow

But... How can the U.S. give us back something they never

TRULY, I NEED YOUR SUPPORT TO CONTINUE PRESSING THE ISSUES OF THE FAILED CHALLENGER LAUNCH VEHICLE, AND PREVENT FUTURE INCIDENTS. REMEMBER THE DEAD DURING THE PERSIAN GULF WAR, WHEN PATRIOT MISSILES FAILED TO DEFEND AGAINST ATTACKING ENEMY SCUD MISSILES. ALSO REMEMBER IT WAS TELEDYNE MICRO ELECTRONICS WHO ADMITTED IN COURT ROOM ACTION THAT THEY DID FALSIFY TESTS ON THE SYSTEMS OF: SPACE SHUTTLES AND PATRIOT MISSILES. AND BY ALL MEANS, REMEMBER THE TRUE ALOHA SPIRIT TO THE WORLD.

PLEASE, I NEED YOUR SUPPORT TO CONTINUE PRESSING THE ISSUES AND TO PREVENT FUTURE INCIDENTS. I DO THIS BECAUSE I CARE FOR THE EARTH AND ALL ITS INHABITANTS, AND MY CHILDREN. I HAVE BEEN CONTESTING THE AEROSPACE PROBLEMS LONG BEFORE MY CHILDREN'S ISSUE, AND BOTH MY CHILDREN ARE BONDED TO ME, AS I AM TO THEM.

REMEMBER THE GOALS OF PRESIDENT KENNEDY, ASK NOT WHAT YOUR COUNTRY CAN DO FOR YOU, BUT WHAT YOU CAN DO FOR YOUR COUNTRY.

SINCERELY,

William F. Hachmeister

WILLIAM FREDERICK HACHMEISTER
I SUPPORT THE BAN ON SPACE NUCLEAR POWER SOURCES WORLD-WIDE.
NOVEMBER 17, 1993.

12-186

Hawaii Carpenters Union

United Brotherhood of Carpenters and Joiners of America, Local 745

November 1, 1993

Councilman Keola Childs
Chairman, Spaceport E.I.S. Subcommittee
of the Planning Committee

Dear Keola,

I wanted to express my appreciation for your invitation to attend the informational hearing on the spaceport issue. I applaud this type of meeting as being an expeditious way of seperating fact from fiction.

Although I am not in a position to ask technical questions, I have several questions that I would like directed to the appropriate "authority":

1) Looking at the Florida, California, and Kauai launch facilities, how many unmanned missiles have been fired at each?

2) How far are these facilities from populated areas?

3) If my memory serves me correctly the facilities in Florida and California must be close to 30 years old. What has been the overall impact on the surrounding communities? (Re: population increase/decrease, rise in health problems evacuations, etc...)

4) Knowing that errant missiles are destroyed, has any non-employee ever been injured?

5) A great deal of concern has been expressed over transporting propellants. Can someone make a comparison to other materials that are routinely transported on this island like gasoline, propane, and dynamite.

Comm. No. 54
File No. SAT
Ref. To: Counc.
Ref. Date NOV. 9

STATE HEADQUARTERS & BUSINESS OFFICES
OAHU
KAUAI OFFICE
MAUI OFFICE
HILO OFFICE

Hawaii Carpenters Union
United Brotherhood of Carpenters and Joiners of America, Local 745

I apologize for the last minute submission but I did not receive your letter until late Friday afternoon.

Sincerely,

JOHN M. DAVIS
Field Representative
Hilo Division

STATE HEADQUARTERS & BUSINESS OFFICES
OAHU
KALAI OFFICE
MAUI OFFICE

Stephen K. Yamashiro
Mayor

Harry Kim
Administrator
Bruce D. Butts
Assistant Administrator

County of Hawaii
CIVIL DEFENSE AGENCY
920 Ulimai Street • Hilo, Hawaii 96720
(808) 935-0031 • Fax (808) 935-6460

November 8, 1993

doc08470

Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT

The following are areas of concern and interest to the Hawaii County Civil Defense Agency relating to the project:

Natural Hazards

1. Tropical Cyclones

   The majority of tropical cyclones that pose potential threats to this island approach from a southeasterly direction. The project is located in an area that would be exposed to hazards of wind, rain, and surf from any southeasterly approaching tropical cyclone. It is strongly requested that effects of tropical cyclones be identified as a hazard for the area and project. Hazards of surf/surge and wind factors must be addressed.

2. Ground Subsidence and Fracturing

   The draft EIS does not address ground subsidence in any detail for the project area. This is perhaps not only the most serious natural hazard for the project but would also result in the most serious impact to people and the environment (uncontrolled releases of toxins). No mention is made in the EIS on mitigating measures for this hazard.

3. Lava Flows

It should be noted that a more likely scenario on lava flows for the area would be of vehicle access to the project being inundated without much advance warnings and developing a situation where project would have to be abandoned by personnel for an extended time. Mitigation measures must address toxins left in the area which may then be threatened by lava flow. The concern is not only the project site but effects on chemicals that may pose a threat to environment and people.

4. Tsunamis

It is questioned as to how one can build to mitigate tsunami impacts. The mitigation should be to build outside of the inundation area.

Unresolved Issues

It is agreed that the unresolved issues must be addressed and resolved. It is disagreed as to when these issues are to be resolved. Risk assessment to harbors, population, and environment needs to be conducted as early as possible in the conceptual stage so decisions and mitigation measures are based on identified risks.

Harry Kim

HARRY KIM, ADMINISTRATOR

dy

NOV 16 '93 12:59 CIVIL DEFENSE-HILO (808)935-0480

P.O. Box 4849
Kailua-Kona, Hawaii 96745

November 12, 1993

REgarding resolution to restrict rocket launching facility in Hawaii:

Please support the resolution and subsequent legislation to make it impossible to develop a rocket launching facility on the Big Island. Environmentally, culturally and safety-wise this ill-conceived project should never be allowed to be a reality. In addition, no more taxpayer money should go into the study of this facility's feasibility.

Thank you for your time.

Sincerely,

Janice Palma

HAWAI'I GREEN PARTY
PO BOX 3220, KAILUA-KONA, HI 96745
Phone: 32-GREEN (324-7336)
November 17, 1993

The Green Party commends the Hawai'i County Council for taking real and specific action on the proposed Ka'u Rocket Launch Facility. The special sub-committee and their findings was greatly needed and appreciated by many citizens in the community. I am submitting a copy of County of Hawai'i Resolution #93 which was presented on September 7, 1993. The groups that signed on to this Resolution would like to go on record for their non-support of the proposed Ka'u Rocket Launch Facility. These groups strongly support home rule and stress the solution-oriented positive actions that are going on in our community, which the proposed Ka'u Rocket Launch Facility draft Environmental Impact Statement failed to address.

Once again, thank you for this opportunity to comment.

Barbara Bell

Barbara Bell, State Co-Chair

12-189

COUNTY of HAWAI'I
RESOLUTION #93

Whereas the Island of Hawai'i is particularly well suited to agricultural efforts, due to its many environmental zones, its year around growing seasons, its rich volcanic soils and plentiful rainfall...

Whereas a diversified economy is essential for a stable and sovereign island state and therefore best suited for weathering the changes of the expanding global marketplace...

Whereas the Island of Hawai'i is known throughout the world for its pristine vistas, its volcanic natural wonders, white, green, and black sand beaches; and it has been determined that repeat visitors to the Island of Hawai'i come back due to the uniqueness of our island...

Whereas there is a strong desire of residents on the Island of Hawai'i to maintain the rural atmosphere of its many small towns and wide open spaces, and the tradition of the aloha spirit...

Comm. No. 548.359
File No. SAT
Ref. To: Presented Council
Ref. Date NOV. 17 1993

Whereas the County of Hawai'i supports home rule; and the idea of local communities making informed decisions about the issues that affect them directly...

Whereas the draft Environmental Impact Statement issued by the State of Hawai'i reveals enormous risks to human life on the Island of Hawai'i, both from the transportation of chemicals and fuels and from the rocket launches...

Whereas the Hawai'i State Department of Business, Economic Development and Tourism, through the auspices of the Office of Space Industry, has spent millions of taxpayer dollars in a seemingly fruitless search for commercial sponsors of an obsolete technological proposal and has thereby created an economic and legislative black hole...

BE IT RESOLVED THAT:
The County of Hawai'i does NOT in any way support the construction of a Rocket Launch Facility (RLF), in the District of Ka'u on the Big Island of Hawai'i, or any other district on the Island of Hawai'i, for commercial or military purposes, due to the inevitable negative impacts of said construction on the socio-economic rural structure of Hawai'i Island society, its unique environments, its multi-cultural heritage, its treasure trove of archeological sites, its growing astronomical community, its Hawai'i Volcanoes National Park, its visitor industry, and the general physical, mental and emotional well-being of its citizenry.

We, the undersigned, are in support of this resolution:
Groups and Businesses:

Aikane Nursery
Big Island Rainforest Action Group
Kapoho Community Association
Citizens with Space Concerns
Common Cause Hawai'i
Earth and Sun's Solutions
Green Party Hawai'i
Life of the Land
Informational Network for the Spaceport
Institute for a Sustainable Future
Na Ala Hele
Ka Lahui Hawai'i
Kalapana Seaview Estates Community Association
Ohana Natural Foods Co-op

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

The Honorable Keiko Bonk-Abramson
Councilmember
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Councilmember Bonk-Abramson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services and Decision Analysts Hawaii, Inc. contributed to the following responses.

Comment: *The jobs which would be created will not go to those who currently need employment on the island. These proposed jobs will instead go to those whom the corporation or state brings in to fill the requirements of very specialized labor.*

Response: The launch facility would provide a considerable number of employment opportunities for Big Island and Ka`u residents. As discussed in the dEIS Volume IX, Appendix A, Executive Summary (pp. ES-2 through ES-5) and Chapters 4 and 5 (pp. 4-1 through 4-9, and 5-1 and 5-2), the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka`u.

The estimated 290 jobs for the local labor force in Ka`u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the aerospace industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In the 1970s and early 1980s, a number of people opposed building telescopes atop Mauna Kea. Many asserted that the telescopes would provide few jobs to Big Island residents since local residents would not be skilled enough to compete for these positions. As it has turned out, however, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents.

Experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels - not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy, universities, airports, hospitals, computer companies, etc. If the launch facility is built, it will also be true there.

Comment: *The economic reality is that this project does not fit with existing economic enterprises on the island, or other proposed economic ventures for economic development.*

Response: Chapter 5 in Appendix A of dEIS Volume IX addresses the impacts of the proposed spaceport on other economic activities on the Big Island. As indicated in this chapter, the spaceport would be compatible with other economic activities. Furthermore, it would have a beneficial impact on the many companies that would supply goods and services to the spaceport, the launch companies, existing residents who will have more money to spend due to the launch facility, and new residents who come to the Big Island as a direct result of the activities there. The spaceport would also benefit the visitor industry, including hotel operators who provide rooms and services to accommodate visiting scientists, technicians and their families.

Agricultural operations located within the Population Control Zone, however, may suffer small adverse impacts since they would have to modify their schedules and/or operations before and during the occasional launches (see dEIS Volume IX, Ch 5, pp. 5-11 through 5-14). These impacts can be mitigated through monetary compensation from the launch companies.

Comment: *There is no scientific or corporation support for building such a facility at this time, on this island...not one corporation has shown more than cursory interest in this project. The project is simply not economically viable on any level at this site.*

Response: Historically, successful economic development occurs within a context of comparative economic advantage. As explained in Chapter 11 of *Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii, February 1993*, the principal comparative advantage offered by Hawaii is that a single launch facility can be used to place satellites into both equatorial and polar orbits. On the mainland, a new launch company must build and maintain two expensive launch facilities: one in Florida for equatorial launches, and one in California for polar launches.

Hawaii's comparative economic advantage has attracted the interest of companies that wish to take advantage of recent advances in rocket-launching technology and have plans to place large constellations of communication satellites in low-earth orbit.

The promotion of Hawaii's comparative economic advantages - combined with State and County assistance in securing the necessary development approvals - is the same approach that was used so successfully in attracting the astronomical telescopes to Mauna Kea.

Comment: *Even if the County could manage the day to day costs of operating this facility, the county would be unable to meet its obligations for partial liability in the event of an environmental catastrophe.*

Response: Liability and insurance would be addressed in the Operating and Site Development Agreement (OSDA) that would be negotiated with the launch companies that form the Consortium. An outline for the text of an OSDA (in the dEIS, Vol X, Appendix E, pp. 50) shows a section called ***General Terms: Indemnification and Insurance***. In this section, the launch companies would agree to take the risk and pay damages from accidents, including those which damage the environment. The companies could, in turn, purchase insurance to cover this potential eventuality. They would also agree to indemnify and defend the State and the County, a common condition of all State contracts. The County should be added as an additional insured in the discussion on pp. 50 - 52 of the dEIS, Volume X, App E:

> *"In order to reduce the probability of years of expensive litigation, the Consortium should be required, to the greatest possible extent, to arrange for all insurance coverage through a single carrier, and the [launch] companies should be covered by insurance that is specific to [the launch facility]. An umbrella policy should cover the Consortium, the [launch] companies, the Users, all subcontractors, and the [add: County and] State. Riders should cover the organizations involved with a particular launch, including those who contract for the launch, provide the launch rocket, provide the payload, all subcontractors, etc. The rider policy should come into effect once the rocket and payload are off-loaded in Hawaii and Hawaii-based personnel become involved in the operation..*
>
> *"With regard to the umbrella policy, the [Site Development and Operating Agreement (SDOA)] between the Consortium and the State should require the [launch] companies to maintain, during the term of the SDOA, liability insurance for personal injury or death, and property damage in minimum amounts as recommended by the State Office of the Attorney General. These figures should be revised periodically (e.g., every 5 years), also as recommended by the Attorney General.*
>
> *"It is also recommended that the State of Hawaii, [add: the County of Hawaii,] and the Authority be named as additional insured, and that a Certificate of Insurance evidencing that the insurance is active be deposited with the [Spaceport] Authority, along with the insurance riders for each launch.*

Comment: *The project is overwhelmingly opposed by the residents of Ka`u and the rest of the island.*

Response: As noted in the cover letter, the State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project.

DIR 2-40/E

JAMES M. RATH
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
1993
Office of Space Industry
DBED

August 11, 1993

Mr. Mufi Hannemann
Department of Business Economic Development
and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Mufi
Aloha ~~Mr. Hannemann:~~

Thank you for your letter of July 26, 1993. I would have a keen interest in seeing the financial projection for the Spaceport.

Mahalo,

Jim Rath
COUNCILMAN

93-231-K
To: [illegible]
Copy to: [illegible]
Ex: [illegible] B KRM
✓ Draft reply for Governor's signature
✓ Draft reply for Director's signature
Direct reply (office Director)
Comment/Recommendation
Follow-up/Tickler
Your information/file
Keep enclosure(s)
Return enclosure(s)
Other
Due Date Aug. 23, 1993

12

12-192

KRM

JAMES M. RATH
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
SEP 28 1993

September 14, 1993

Ken Munechika
Department of Business, Economic Development
and Tourism
Office of Space Industry
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Munechika:

In reviewing the Draft EIS for the Spaceport there is one glaring, outstanding and obvious omission in the data. Spaceport Draft EIS - Volume 9, page 4-18 references the financial aspects of this project, as reference (1). The information regarding the financial viability is listed as coming from DBEDT.

At the briefing for the County Council when I asked you for the information, you stated that it was predecisional and deliberative in nature and contained information from Lockheed that was confidential and proprietary.

In other words Mr. Munechika, we have the State of Hawaii spending millions of taxpayers dollars for a project that should, by rights, be let out to bid and not simply handed over to Lockheed.

ALL INFORMATION HAS TO BE PUBLIC!!

I fully realize that the State "Democrat Machine" may be very fond of non-bid contracts, back door deals, and obvious conflicts of interest, but I am not!

I was elected to represent the people of Hawaii County.

Since the bottom line of any venture, especially one of this magnitude and impact, has to be its' financial viability, it is inconceivable that this information should remain secret.

I hereby demand that his information, in its' entirety, be made public. Since the 90 day review time for the Draft EIS is already underway, if I do not receive this financial information in 48 hours, I will have no other choice than to seek any and all methods, under the law, to see that it is made public.

With best regards,

Jim Rath
COUNCILMAN

cc: John Waihee, Governor, State of Hawaii
Andy Levin, State Senator
Virginia Isbell, State Representative
Larry Tanimoto, State Representative
Mufi Hannamann, Director, DBEDT
Takeshi Yoshihara, Deputy Director, DBEDT
Jay Hanson
Frank Jung
Curtis Tyler
West Hawaii Today
Hawaii Tribune Herald
Honolulu Advertiser

12-193

JAMES M. RATH
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
SEP 22 1993
Office of Space Industry
DBED

September 22, 1993

Mufi Hannemann
Department of Business, Economic Development
and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear ~~Mr. Hannemann~~: Mufi

Do you know what a "Napkin Story" is? I'll tell you.

After a hard day of trying to sell their wares, two out of town salesmen meet in the hotel bar. As they sit there banging down drinks, they start telling each other how great they are. Once satisfied that they are the two greatest salesmen in the world. they pull out pens and start designing a business, writing all the numbers on the bar napkins.

It starts with what they can buy, and how much they can sell it for. By the end of the evening, and scores of napkins later, their plan has grown to a nationwide franchise where the two of them are millionaires.

As the lights go on, the barkeep scoops up the napkins and dumps them in the trash. In the light of morning the salesmen awake in their respective rooms to the cold reality that they are behind on their monthly quotas, their house payments, car payments, and charge cards. In addition they are forty bucks poorer, the common price of an extra large hangover.

I have just finished reading "FINANCIAL FEASIBILITY STUDIES RELATED TO THE PROPOSED HAWAII SPACEPORT", or, as I like to call it, "KEN MUNECHIKAS' NAPKIN STORY!"

There is NO STUDY to show that there is a MARKET for a Spaceport in Ka'u.

I will enclose for you an article that appeared in the ST. Petersburg Times about Florida's failed Spaceport. In Florida, where you do not have to ship the rockets, the fuel and the payloads three thousand miles, where you do not have to excavate lava rock, they could not find a market, nor make money

Mr. Hannemann
September 22, 1993
Page Two (2)

The "Democrat Machine" has gotten drunk with power and given us this "Napkin Story". In the cold light of reality, please wake up to find that we are behind on education, behind on tourism, behind on bringing prosperity to our people.

I hope that you enjoy your 7.5 million dollar hangover. The taxpayers sure don't.

With best regards,

Jim Rath
COUNCILMAN

cc: Ken Munechika
West Hawaii Today
Hawaii Tribune Herald
Honolulu Advertiser
Honolulu Star Bulletin

12-194

JAMES M. RATH
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

September 28, 1993

Ken Munechika
Department of Business, Economic Development
and Tourism
Office of Space Industry
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Munechika:

Please fax to my office a copy of the ECONOMIC FEASIBILITY REPORT that was done by CH2M HILL shorty before they were terminated by the State. This is the one that State money (taxpayers) was used to produce, and the same one that Admiral Hayward referred to in a meeting in Ka'u as the one he was not happy with.

As you know, I was totally unimpressed with the Financial Feasibility Studies Related to the Proposed Hawaii Spaceport, dated this month, that I received from your office. It has more holes than a Swiss Cheese.

I understand that your background is military, as Mufi is political science, so business may be a little hard for you guys. Let me point out just a few small items.

First, unlike what you stated to the paper, that this is private money, the expenditures to date (nearly 8 million taxpayer dollars) have not included one dime of private money. Ken, there is NO private money at RISK here, unless you count Admiral Haywards income from Lockheed.

Second, in business, a 4% return is not considered a good one. This is even worse when you consider what a high risk venture this is.

Ken Munechika
September 28, 1993
Page Two (2)

Third, when you "make up" numbers, at least check them to make sure they make sense and follow what you have said before. For example; you claim 270 jobs created by this venture, yet your salary numbers show otherwise. At 5 million dollars salary this would produce an average income of about $19,000 each. You do not reach 5 million until 1997, and that shows 6 launches in 1996, in the 15 launch spreadsheet. In all spreadsheets, the 15, the 18 and the 22, you show 6 launches in 1996, yet the wages vary from under 3 million to over 3 million. I would submit to you that in 1996 the wages to launch 6 rockets would remain constant, regardless of future expected launches.

Fourth, the land rent is unbelievable. It shows, for the 14000 acres that the rent would equal 50% of the value of the land per year. Looks like the land owners, Bishop Estate, C. Brewer, and the State will make out like bandits on this. Doesn't the State own the smallest part? I know the Bishop owns about 40%.

This project is financial folly and a gigantic waste of taxpayers money, especially in light of the negative effects on the citizens of Hawaii County, not even counting the problems we face in the basic needs here, such as education, or the need to promote existing industries.

I realize that I have been outspoken, even rude and caustic, when attacking this State boondoggle. I first thought that there must be some "secret agenda", otherwise, why would the State keep going forward with such a stupid plan. Sure the land monopolies and special interest will make out like bandits, but that's nothing more than "business as usual" for the Democratic Machine. We already expect that.

I felt there must be something more than a possible, but improbable, 4% gain on a 400 million dollar investment. There is not! No nuclear powered rockets, no plan for military use (SDI).

It's ego. Too much ego to say that this is not financially feasible, too great a risk to the people of the Big Island.

I may be yelling "FIRE" in a movie theater, but that's OK when the theater is on fire!

With best regards,

Jim Rath
COUNCILMAN

cc: Mufi Hannemann
West Hawaii Today
Hawaii Tribune Herald
Honolulu Advertiser
Honolulu Star Bulletin

12-195

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN W.
GOV.
JEANNE K. SCH
DIR.
RICK E
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

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SEP. 30 1994

The Honorable Jim Rath
Councilmember
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Councilmember Rath:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

These responses are made to dEIS-related comments contained in letters dated September 14, 23, and 28, 1993. Your other comments were responded to in previous correspondence. Decision Analysts Hawaii, Inc. contributed to the following responses.

Comment: *Because the spaceport project involves taxpayer dollars, it should be let out for bid and not simply handed over to Lockheed.*

Response: It is true that the State has spent funds on various studies to determine the benefits and impacts of a commercial launch facility. Furthermore, if the project proceeds to development, then additional funds would be spent to acquire land rights, obtain permits, improve roads, etc. One of the purposes of this initial investment would be to attract one or more launch companies to Hawaii. This approach is similar to the one used successfully by the University of Hawaii to attract telescopes to Mauna Kea.

If it is successful, this financial investment by the State would lead to a number of benefits to Hawaii, including increased job opportunities, a wider choice of jobs, increased family incomes, a wider selection of stores and services made possible by an expanded economy, increased tax revenues and, finally, the pride many of Hawaii's citizens would have in being involved in a valuable international resource for commercial rocket launching.

With regard to your comment that the project should be let out to bid, if more than one major launch company were to show an interest in establishing in Hawaii, the State would negotiate with all of the interested launch companies and encourage a pooling of their resources to develop and operate the launch facility. If more firms express interest in operating in Hawaii than can be accommodated, then the project could be put out to bid.

Comment: *Financial assumptions and projections should be made public.*

Response: A copy of the assumptions used for financial forecasts will be printed in the final EIS.

Comment: *There is no study to show that there is a market for a spaceport in Ka'u.*

Response: The dEIS economic forecasts are based on launch rate assumptions developed for the conceptual plan. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the available number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

As explained in the Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii, February 1993, Chapter 11, the principal comparative advantage offered by Hawaii is that a single launch facility can be used to place satellites into both equatorial and polar orbits. Hawaii's comparative economic advantage has attracted the interest of companies that wish to take advantage of recent advances in rocket-launching technology and have plans to place large "constellations" of communication satellites in low-earth orbit. The promotion of Hawaii's comparative economic advantages--combined with State and County assistance in securing the necessary development approvals--is the same approach that was used so successfully in attracting the astronomical telescopes to Mauna Kea.

Comment: *In business, a 4 percent return is not considered a good one. This is even worse when you consider what a high risk venture the spaceport is.*

Response: Under the assumed scenario analyzed in the dEIS, the projected return on equity to the Spaceport Consortium is 11 percent, not 4 percent. The rates of return are given in the aforementioned Conceptual Plan and Project Description, p. 11:

> *"Over the first 15 years of operation, the launch facility would garner a 10.9 percent internal rate of return for the average scenario, and 18.8 percent and 3.8 percent for the optimistic and conservative scenarios, respectively."*

The middle range of approximately 11 percent was used consistently throughout the impact analysis.

Furthermore, the potential profitability of the launch facility should not be judged only by the return to the Consortium--particularly since launch fees and other fees charged by the Consortium should be kept relatively low in order to increase the return to the launch companies, thereby making a Hawaii location attractive to them. An analogy can be made with the return received by an airport operator (equivalent to the Consortium) vis-a-vis the return to the airline companies (equivalent to launch companies) that use an airport. In this case, the bulk of the profits go to the airline companies rather than the airport, thereby providing an economic incentive to the airlines to fly to that particular destination airport.

Comment: *In the financial projections for 1997, which includes 6 launches in 1996, there is an estimated $5 million allowance for salaries, which averages to $19,000 per employee. The 6 launches for 1996 are included in all of the spreadsheets (the 15, 18, and 22 launch scenarios), yet the wages vary from under 3 million to over three million. I would submit to you that in 1996, the wages to launch 6 rockets would remain constant, regardless of future expected launches.*

Response: First, as the dEIS states, the average salary for the 270 jobs created at the spaceport is $34,000. The salary allowance in the spreadsheets only includes 170 workers employed by the spaceport to provide common services to the private launch companies. The additional 100 workers would be employed by private launch companies, therefore are not included in the spreadsheet. Secondly, the wage variation between the different launch rate scenarios is the result of assuming that employment numbers would ramp up to maximum values at different rates. We recognize that many of the assumptions used to formulate this financial model will be refined in the future as a prospective developer will determine financial projections based on a specific project, not a conceptual plan.

Comment: *The land rent is unbelievable. It shows that rent for the 14,000 acres would equal 50 percent of the value of the land per year.*

Response: The developed or improved portion of the launch facility would cover about 1,000 acres--most of which is already owned by the State of Hawaii. The remaining land needed for the developed or improved portion of the launch facility would be purchased at its fair-market value. The land is assessed at more than $1,000 per acre, and it could be assumed that the ocean front property is worth more. The state could use eminent domain, or choose to seize land rights by imposing covenants, restrictions and conditions on the landowners (thereby effectively depreciating the current land value)--either way the state must pay fair market value.

The undeveloped or unimproved lands within the Population Control Zone would cover more than 9,000 acres. These undeveloped or unimproved lands that are privately owned would remain in private ownership and available for agricultural use. Landowners, however, would be compensated for any decrease in the value of their land due to reduced development potential (Appendix IXA, pp. 7-12 and Appendix IXE, pp. 5-7), copies attached. Furthermore, any covenants, conditions or restrictions on landowners would require mutual written agreement between the State and the landowner.

Although it is not estimated in the dEIS, the cost of obtaining land rights would be less than purchasing the entire 10,400 acres. As indicated above, the 10,400 acres includes some land which is already owned by the State, and also includes substantial acreage in the Population Control Zone which would remain under private ownership.

The cost of purchasing land rights was not estimated in the dEIS for two reasons. First, if such an estimate were to be made, it could affect negotiations. Second,

estimates of land cost and rent were not needed for the economic-impact portion of the dEIS because land rent received by the State from the Consortium is expected to be about the same as, or somewhat more than, the debt service paid by the State for the cost of land rights (see Appendix IXA, p. 8-3). Thus, the net impact on State finances would be zero, since the expenditures on the debt service on the land would be canceled out by the rental income.

Comment: *This project is financial folly and a gigantic waste of taxpayer money, especially in light of the negative effects on the citizens of Hawaii County, not counting the problems we face in meeting basic needs here such as education and supporting existing industries.*

Response: Chapter 5 in Appendix IXA of the dEIS addresses the impacts of spaceport on other economic activities on the Big Island. As indicated in this chapter, the spaceport would be compatible with other Big Island economic activities. Furthermore, it would have a beneficial impact on the many companies that would supply goods and services to the spaceport, the launch companies, existing residents who will have more money to spend due to the launch facility and new residents who come to the Big Island as a direct result of the activities there. The spaceport would also benefit the visitor industry, including hotel operators who provide rooms and services to accommodate visiting scientists, technicians, and their families.

Agricultural operations located within the Population Control Zone, however, may suffer small adverse impacts since they would have to modify their schedules and/or operations before and during the occasional launches (see Appendix IXA, pp. 5-11 through 5-14). These impacts can be mitigated through monetary compensation from the launch companies.

The annual amounts at full development of $3.7 million to the County and $4 million to the State are not the total tax revenues that would be available to cover school, infrastructure, social and public-health services. Rather, these amounts are the net tax revenues that would remain after the County and State fund supporting infrastructure and services.

ROBIN J. YAHIKU
County Clerk

CONSTANCE R. KIRIU
Deputy County Clerk

BOBBY JEAN LEITHEAD-TODD
Legislative Auditor

OFFICE OF THE COUNTY CLERK
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

November 18, 1993

Mr. Takeshi Yoshihara, Deputy Director
Dept. of Business, Economic
Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Enclosed is a copy of Resolution No. 135-93 which was adopted by the Council of the County of Hawaii on November 17, 1993.

Robin J. Yahiku
COUNTY CLERK

Encl.

RJY/hkd

12-198

COUNTY OF HAWAII STATE OF HAWAII

RESOLUTION NO. 135 93

WHEREAS, the State Department of Business, Economic Development and Tourism desires to facilitate the development of a rocket launch facility, also known as a "spaceport," in the Ka'u District of the island and county of Hawaii, and has undertaken various research and investigative studies toward that objective, including the definition of a conceptual plan for such a rocket launch facility and the preparation and publication of a Draft Environmental Impact Statement (D.E.I.S.) in compliance with the provisions of Chapter 343, Hawaii Revised Statutes; and

WHEREAS, based on general agreement among citizens of this state that land use and permitting decisions should rest at the county level of government, the Council of the County of Hawaii wishes to express official comment on the conceptual plan and the D.E.I.S.; and

WHEREAS, the Council of the County of Hawaii, having extensively reviewed, researched and considered such D.E.I.S., finds that significant and critical informational deficiencies existing in that document render the D.E.I.S. wholly inadequate as a basis for approving the proposed conceptual plan and development of the proposed project; and

WHEREAS, such deficiencies instead serve to raise grave concerns about the viability and safety of the proposed project, for example:

(1) the lack of a comprehensive and integrated assessment of the natural disaster risks and hazards peculiar in combination and severity to the area where the facility would be situated, such location being described by the Hawaii County Civil Defense Agency Administrator as one of the world's worst areas for natural disasters, and

(2) the lack of any data on upper atmospheric air circulation as is acknowledged to be critical in making a proper assessment of launch impacts on the observatory facilities of Hawaii's fragile, high value astronomy industry atop Mauna Kea, and what, if any, practicable mitigation measures exist once reliable atmospheric data has been obtained, and

(3) the questionable feasibility of mitigating launch impacts on astronomy and marine resources through the proposition that launches would only occur during yet unknown wind conditions and while no sea turtles were present within a 78 square mile offshore area, and

(4) no study has been done regarding the launching of nuclear materials, although it has been recognized and affirmed by the Office of Space Industry and the State Attorney General, by formal opinion dated January 31, 1991, that pursuant to the pre-emption doctrine, a state statute prohibiting the use or launching of nuclear materials is not enforceable or effective as to any federal government activities, while this county and state rests in national political, legal and economic environments where the federal government is in fact either financially or administratively involved in planning, certifying or financially subsidizing many if not most rocket launches or payloads, and

(5) the apparent failure of the fuel spill management scenarios to include reasonable postulation of "worst case" conditions rather than "average case" conditions as the sub-consultant (ACTA) admitted to have used in preparing its risk assessments; and

WHEREAS, the cost to research and obtain the omitted information and to restructure the D.E.I.S. risk assessments has been proclaimed by the representatives of the Office of Space Industry to be substantial, and by inference is seen to exceed one million additional dollars over that committed to the existing D.E.I.S. document, which cost the council finds unreasonable in light of the extensive risks already identified in the D.E.I.S. and the non-existence of a private sector commitment to develop any such facility at the proposed site.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE COUNTY OF HAWAII this document shall be its official comment on the D.E.I.S.; and

BE IT FURTHER RESOLVED that based on the content of the D.E.I.S and through the council's research, Palima Point, Ka'u, is not a safe and appropriate location for a rocket launch facility; and

BE IT FURTHER RESOLVED that it requests Governor John D. Waihee, III to halt the expenditure of any additional state funds either (1) for the extensive remedial studies required to amend and properly complete the Draft Environmental Impact Statement, or (2) to facilitate, promote or subsidize development of a rocket launch facility at Palima Point, Ka'u, County of Hawaii; and

BE IT FURTHER RESOLVED that future state government funds should be spent on direct economic benefits for the Ka'u region through a further commitment to education, diversified agriculture activities, increased funding of the Community-based Economic Development programs of the State's Department of Business, Economic Development and Tourism; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to Governor John D. Waihee III; Stephen Yamashiro, Mayor, County of Hawaii; Norman Mizuguchi, President of the Senate; Malama Solomon, Senator; Richard Matsuura, Senator; Andrew Levin, Senator; Joseph Souki, Speaker of the House of Representatives; Jerry Chang, Representative; Harvey Tajiri, Representative; Robert Herkes, Representative; Dwight Takamine, Representative; Virginia Isbell, Representative; Larry Tanimoto, Representative; Mufi Hannemann, Director, Department of Business, Economic Development and Tourism; and Takeshi Yoshihara, Deputy Director, Department of Business, Economic Development and Tourism.

12-200

Dated at Hilo, Hawaii, this 17th day of November, 1993.

INTRODUCED BY:

COUNCIL MEMBER, COUNTY OF HAWAII

COUNCIL MEMBERS, COUNTY OF HAWAII

COUNTY COUNCIL
County of Hawaii
Hilo, Hawaii

I hereby certify that the foregoing RESOLUTION was by the vote indicated to the right hereof adopted by the COUNCIL of the County of Hawaii on November 17, 1993.

ATTEST:

COUNTY CLERK

CHAIRMAN & PRESIDING OFFICER

ROLL CALL VOTE

	AYES	NOES	ABS	EX
ARAKAKI	X			
BONK ABRAMSON	X			
CHILDS	X			
DE LIMA	X			
DOMINGO	X			
HALE	X			
RATH	X			
ROSEHILL	X			
SCHUTTE	X			
	9	0	0	0

Reference

RESOLUTION NO. 135 93

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

General Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

Robin Yahiku
County Clerk
County of Hawaii
25 Aupuni St.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Robin Yahiku:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-201

The following are responses to comments contained in County of Hawaii Resolution No. 135-93. ACTA Inc., Dr. Richard Brock, Engineering-Science, Inc. and Risk Science Associates contributed to the responses.

Comment: *The Hawaii County Council finds that significant and critical informational deficiencies existing in the dEIS render the document wholly inadequate as a basis for approving the proposed conceptual plan and development of the proposed project.*

Response: We find it difficult to respond to a general statement that the dEIS is deficient. The document meets all of the Chapter 343, Hawaii Revised Statutes content requirements, and although the document was never intended to substitute for an Environmental Impact Statement under NEPA, all of the NEPA content requirements (as of 1991 when the EIS was contracted) were incorporated into the document. Project specific requirements will be addressed in a supplemental document--to be funded by the prospective developer--when a project is known.

"Unresolved Issues" is a content requirement of the State EIS Rules. In an initiative of this scope, the process of analysis and review should be as deliberate as possible. As a programmatic document with limited budget (compared to most EIS of similar scope), the dEIS analysis identified several areas that need further study before an informed "go/no-go" decision can be made. It was a policy decision of the State to defer further studies until an actual project is imminent so that these studies could be funded by the prospective developer and not the State. The unresolved issues will be addressed in future environmental assessments and statements.

The Health Risk Assessment conducted for this project (DEIS Appendix VIIIA) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Comment: *The dEIS lacks a comprehensive and integrated assessment of the natural disaster risks and hazards peculiar in combination and severity to the area where the facility would be situated, such location being described by the Hawaii County Civil Defense Administrator as one of the world's worst areas for natural disasters.*

Response: The dEIS states the natural hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed

analyses if the proposed project were to proceed. Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire Island of Hawaii. Furthermore, as stated in Appendix IIIA (page 19):

> *"...the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard, albeit without a formal, quantitative risk analysis, so that the appropriate decision-makers could decide whether to proceed or to abandon the project."*

The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concerns with regard to a tropical storm are whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community. Structures can be sited, engineered and designed to satisfy these needs, as documented in the recent experience at Johnston Island where toxic chemicals were stored in bunkers that withstood the force of Hurricane John. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms.

The dEIS is based on a conceptual plan, the facilities have not been designed. Even the facility locations and the facilities themselves are only one indication of what might be expected if a real project is developed. On page 1-5 of Volume I is a discussion of the limitations of the dEIS and further work required. The paragraph states, *"In many cases, the dEIS raises questions that cannot be answered with available data and/or project information...It is intended that these issues will be resolved in a supplemental EIS which will be prepared when an actual project is planned."*

While it is possible to build facilities to survive severe storms, they may be costly, which is a factor the launch vehicle organization will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is built, then the siting, engineering, design, and operational features must be developed to address specific issues relating to natural hazards.

Comment: *The lack of data on upper air circulation, which is critical in order to make a proper assessment of launch impacts on the Mauna Kea observatories and what, if any, practicable mitigation measures exist once reliable atmospheric data has been obtained.*

Response: An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions

that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis identified certain conditions where there is a relatively high probability of transport of a rocket plume into the field of view of the observatories. These conditions occurred during both south and east launch trajectories with the highest percentage of unfavorable wind directions occurring during an east launch. A copy of the report is attached.

The scope of the described analyses was limited to identifying the percentage of time favorable wind directions would be present. The wind direction analysis provides the first step in understanding the potential for favorable launch conditions. However, even with unfavorable wind directions, high wind speeds could produce adequate transport to clear the plume from the field of view within a short time. Further refinement of the analyses to include the wind speed and the correlation between winds at different altitudes is left to future tasks in the event the project moves forward.

The new results described in the attached report provide information not available during the preparation of the draft EIS. The analysis suggests that it may be possible to modify the mitigation to increase the probability of favorable launch windows without compromising astronomical observations. Specifically, it might be acceptable to replace the prohibition against launches when there is a southerly wind component with a stipulation that ..."there will be no launches when the wind would carry the plume above a specified elevation (e.g. 30 degrees) at any time, as view from the observatories." Also, the requirement that the plume be transported out of the field of view (sky above 15 degrees elevation) within two hours of launch might possibly be replaced with a requirement that ..."the plume must not be in the field of view for longer than two hours." This would mean that the two-hour clock would not necessarily have to start at launch.

Obscuration by plumes is a potentially serious problem for which the currently proposed mitigation (as stated in Chapter Five of the DEIS) is believed to be adequate. These mitigating measures will not be changed at the present time. In the event the project moves forward, however, and refined analysis--as mentioned above--is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH IfA for approval.

Comment: *The feasibility of mitigating launch impacts on astronomy and marine resources through the proposition that launches would only occur during yet unknown wind conditions and while no sea turtles were present within a 78 square mile area offshore is questioned.*

Response: It is stressed that State policy will not allow the launch facility to compromise viewing at the Mauna Kea Observatories. The dEIS acknowledges that site specific meteorological data was limited and that the certain aspects of spaceport analyses cannot be fully addressed unless, and until, an on-site meteorological data collection program is implemented. The seven atmospheric soundings used as a basis to

analyze the dispersion of rocket exhaust plumes and abort clouds were intended to cover the range of the most prevalent weather patterns expected to occur in the Palima area.

When examining the feasibility of mitigating measures in relation to astronomy concerns, it is reasonable and prudent to examine the range of meteorological conditions which apply to the area. The existence and documentation of "best case" scenarios indicates that there are certain weather patterns which are favorable to safe launch conditions. Likewise, every effort was made to understand the unfavorable aspects of the Palima meteorology in order to define a "reasonable worst case scenario" for assessing astronomy impacts associated with potential launches. Determination of these conditions involved coordination between ACTA analysts and Dr. Thomas Schroeder, a meteorologist at the University of Hawaii, as well as review of other publications pertaining to meteorological studies of the island of Hawaii.

It should also be stated that prior to and during actual operations of the Palima spaceport the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I on page 2-14 states:

> *"Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket."*

With regard to mitigation measures for sea turtles, we are unaware of any mitigation measure proposed that would insure that no sea turtles were in a specific area (78 square miles!!) offshore of the launch site prior to any launch. Other launch sites have sea turtles present during launches (e.g., the Kauai facility at Barking Sands, and the Canaveral facility in Florida) and this kind of mitigation has never been proposed for those facilities. It is both a near-impossible action to take and would have little or no value because the likelihood of debris from an aborted launch actually coming into contact with a sea turtle in this open-ocean setting is near zero.

Comment: *No study has been done regarding the launching of nuclear materials, although it has been recognized and affirmed by the Office of Space Industry and the State Attorney General that a state statute prohibiting the use of launching nuclear materials is not enforceable or effective as to any federal government activities, while Hawaii County and State rest in national political, legal and economic environments where the federal government is in fact either financially or administratively involved in the planning, certifying, or financially subsidizing many if not most rocket launches or payloads.*

Response: Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point.

Although it is possible that the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government does not, in fact, have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: *The fuel spill scenarios fail to include "worst case" conditions rather than "average case" conditions as the sub-consultant (ACTA Inc.) admitted to have used in preparing its risk assessments.*

Response: Weather conditions at the representative potential accident locations used in the transportation hazard assessment were selected by Dr. Thomas Schroeder, University of Hawaii. The crucial issue from a health perspective is the concentration of the substance released. Brisk winds and unstable atmosphere lead to optimum diffusion, therefore lower concentrations. The worst case winds are light winds with high stability, which prevent the dispersion of materials. A nocturnal drainage condition is the worst combination because there is a shallow inversion and the movement is simply along topological contours, much like water flowing downhill.

The weather conditions used in the transportation assessment were selected from data sets by Dr. Schroeder based on the "worst case" diffusion conditions during daytime and nighttime periods. As noted in Appendix VIA (page 3-4), most of the wind speeds selected from the data sets are under 3 meters per second, which are a close approximation of the lightest winds that would ever be measured at the representative locations. Most of the time the winds would be stronger, resulting in lower concentrations downwind from the spill.

Risks due to spills from storage and handling on-site are quantitatively evaluated in Section 9.0 of the health risk assessment (Appendix VIIIA). Peak 60-minute time mean concentrations of hydrazine, UDMH, and nitrogen tetroxide were modeled by ACTA and used in this assessment. In the analysis, spill "mitigation" efforts are assumed in which passive containment of a spill by existing physical barriers takes place. As described on page 9-1, the spill mitigation efforts do not refer to active containment and clean-up efforts by a hazardous materials emergency response team." In this sense, therefore, all spill scenarios were modeled as "worst case" events where the spilled liquid was allowed to remain and evaporate over time with no effort made at remediation. This is an improbable situation which would not be allowed to happen. A spill would be actively contained and cleaned-up immediately, most likely within 5-20 minutes depending on the size of the spill.

The cancer risks and hazard indices reported in the health risk assessment are maximum values resulting from worst case atmospheric conditions determined under this

worst case scenario. Similarly, short-term cancer risks and acute hazard indices for transportation spills resulting from worst case atmospheric conditions are given in sections 10.2 and 10.3 of the health risk assessment (Appendix VIIIA).

The exposure assessment conducted in the health risk assessment quantitatively evaluates potential health risks and is based upon an estimation of expected reasonable maximum exposure (EPA 1989). As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure" (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that is *"conservative and most likely overestimate dosages and risk, thus its utility in assuring that risks are not underestimated."*

Reevaluation of the transportation accident scenario assuming spill of more than one barrel is not required nor would it be informative because spilling one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers:

> *"The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide (DEIS Volume 1, page 5-4)."*

An analysis of multiple drums spilled would just reaffirm the findings of significant risk. In addition, because there is no "standard" truck size for carrying 55 gallon drums or 300 gallon cylinders of chemicals, the number of drums analyzed in a multiple barrel spill would be highly speculative. It is also not unreasonable to restrict trucks to one barrel per load.

Dr. Alvin Greenberg, President of Risk Science Associates, did additional research on HAZMAT team capabilities. He states:

> *"The use of a 15-minute blanketing time is reasonable. Extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment. It must be remembered that the hazardous materials response team will travel in the convoy and be partially suited-up. Their efforts will be directed immediately toward spill containment after donning respirators and gloves. Anyone who has ever worn full protective equipment or who has even witnessed a hazardous materials response demonstration knows that a self-contained breathing apparatus can be donned and the protective suit sealed in a matter of minutes. In fact, the emergency response personnel consulted for this project stated that under these specific conditions of transportation, containment and covering of a one drum spill could be accomplished in 10 minutes."*

Comment: *The cost to research the omitted information and to restructure the dEIS risk assessments has been proclaimed by representatives of the Office of Space Industry to be substantial, and by inference is seen to exceed $1 million over that committed to the existing document. The Council finds these costs unreasonable in light of the extensive risks already identified in the dEIS, in addition to the non-existence of a private sector commitment to develop any such facility at the proposed site.*

Response: The dEIS is based on a conceptual plan, not an actual project. The dEIS identifies hazards and mitigation measures based on the conceptual plan. Risks are usually defined in the context of casualty expectations, derived from the combination of the probability of an accident or failure occurring and the consequences of that event or failure to a system's operators, users, or its environment. Risk assessments involve the process and procedures of identifying, characterizing, quantifying and evaluating risks and their significance. The interactions are particularly important because one piece of equipment might be caused to fail by another's failure to, for example, supply fuel or current.

The dEIS does identify within the context of a conceptual plan those processes that contribute most heavily to risk and suggests ways of minimizing or mitigating the risk. Until an actual project is defined, there is no way to quantitatively assess what the potential risks of a real project might be. For example, it is not known whether the proposed vehicle(s) will use solid, liquid, or a combination of propellants or in what quantities, or how many shipments will be made. Container design, ship and dock specifications, crane requirements for off-loading the stages or propellants, as well as safety features and procedures, are only a few of the factors that must be considered in a detailed risk assessment that can only be determined by specific project characteristics.

The cost of additional environmental analyses would depend on the specific project being contemplated. Supplemental environmental analyses would be the responsibility of the private developer. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services. Any additional state expenditures would be dependent on authorization and funding by the state legislature.

Comment: *Palima Point is not a safe and appropriate location for a rocket launch facility.*

Response: Palima Point was selected for a number of reasons, principally because it is very favorable for both polar and equatorial launches. The natural hazards of the area are well recognized. The site was selected despite the obvious hazards for the same reason that people choose to live in Ka`u despite the obvious hazards: favorable conditions are seen to outweigh the risks.

The State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. If and when a private developer proposes an actual project, lava flow and seismic hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

Comment: *The Hawaii County Council requests Governor John Waihee to halt the expenditure of additional state funds to either amend the dEIS or to facilitate, promote, or subsidize development of a rocket launch facility at Palima Point.*

Response: As stated in the cover letter:

> *"After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time."*

Comment: *Future state government funds should be spent on direct economic benefits for the Ka`u region through a further commitment to education, diversified agriculture, and increased funding of the Community-based Economic Development programs.*

Response: The role of the State is to encourage activities which have state-wide benefits. It would indeed be desirable for the residents of Ka`u to continue to pursue community-based economic development (CBED), as they are doing now. This approach is consistent with the history in the United States, where most successful development is achieved by local entrepreneurs who receive little or no direct government assistance. Nevertheless, government can still play a pivotal role in facilitating development that is beneficial, yet cannot be spawned from resources within a community. On the Big Island, the Mauna Kea Observatories may be the best example of this.

Furthermore, development such as a launch facility, if successful, would benefit CBED by expanding opportunities for local entrepreneurs (see Appendix IXA, p. 5-2). New opportunities would be presented to supply goods and services to companies and workers at the launch facility, existing Ka`u residents who would have more spendable income, new residents, and visiting workers.

In pursuing CBED, the goals and wishes of Ka`u residents are obviously critical, but in the process of setting their goals, residents must consider which activities are economically feasible in Ka`u, given its remote location, distance from markets, and its limited support services for businesses. Simply put, for most new business activities, Ka`u does not offer a comparative advantage over other places in Hawaii; in most cases, it would be more profitable for economic activity to locate elsewhere.

For example, diversified agriculture is often mentioned for CBED by residents throughout the State, not just by those who live in Ka`u. The best place in Hawaii for most crops, however, is Central Oahu on lands currently being released from sugar production by Oahu Sugar Co., Ltd. Such lands are among the best farm lands in the State: soils are deep with good machine tillability, the area is very sunny, and an ample supply of very low-cost water is available. Furthermore, these lands are ideally located for agriculture due to their proximity to the large Honolulu consumer market, to supply markets, and to overseas air and surface shipping terminals. Thus, for most crops, Central Oahu has a strong comparative advantage over Ka`u. Crops will indeed be grown in Ka`u, but the opportunities will be limited by comparison to Central Oahu.

Overall, it is difficult to be optimistic about the prospects for full employment in Ka`u, even if both CBED and the launch facility are realized (Appendix IXA). Ka`u needs jobs for existing unemployed workers, for those who will be laid off soon from Ka`u Agribusiness Co., Inc., for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. Resorts are a possibility, but after many attempts over the years, significant resort development has yet to be realized in Ka'u. And while diversified agriculture is expected to expand, it will not be sufficient to provide full employment.

attachment

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

c: Ken Munechika, DBEDT

SEND COPIES TO APPROPRIATE PARTIES

POSTED NOV 10 1993

Stephen K. Yamashiro
Mayor

Harry Kim
Administrator

Bruce D. Butts
Assistant Administrator

'93 NOV 15 A

County of Hawaii
CIVIL DEFENSE AGENCY
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November 8, 1993

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Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT

The following are areas of concern and interest to the Hawaii County Civil Defense Agency relating to the project:

Natural Hazards

1. Tropical Cyclones

   The majority of tropical cyclones that pose potential threats to this island approach from a southeasterly direction. The project is located in an area that would be exposed to hazards of wind, rain, and surf from any southeasterly approaching tropical cyclone. It is strongly requested that effects of tropical cyclones be identified as a hazard for the area and project. Hazards of surf/surge and wind factors must be addressed.

2. Ground Subsidence and Fracturing

   The draft EIS does not address ground subsidence in any detail for the project area. This is perhaps not only the most serious natural hazard for the project but would also result in the most serious impact to people and the environment (uncontrolled releases of toxins). No mention is made in the EIS on mitigating measures for this hazard.

3. Lava Flows

   It should be noted that a more likely scenario on lava flows for the area would be of vehicle access to the project being inundated without much advance warnings and developing a situation where project would have to be abandoned by personnel for an extended time. Mitigation measures must address toxins left in the area which may then be threatened by lava flow. The concern is not only the project site but effects on chemicals that may pose a threat to environment and people.

4. Tsunamis

   It is questioned as to how one can build to mitigate tsunami impacts. The mitigation should be to build outside of the inundation area.

Unresolved Issues

It is agreed that the unresolved issues must be addressed and resolved. It is disagreed as to when these issues are to be resolved. Risk assessment to harbors, population, and environment needs to be conducted as early as possible in the conceptual stage so decisions and mitigation measures are based on identified risks.

Harry Kim

HARRY KIM, ADMINISTRATOR

dy

JOHN WAIHEE
GOVERNOR
JEANNIE K. SCHULTZ
DIRECTOR
RICK BOGGS
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
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SEP. 30 1994

Mr. Harry Kim
Administrator
County of Hawaii
Civil Defense Agency
920 Ululani St.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Kim:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-207

ACTA Inc. contributed to the following responses.

Comment: *The majority of tropical cyclones that pose potential threats to the Island of Hawaii approach from a southeasterly direction. The project is located in a area that would be exposed to hazards of wind, rain, and surf from any southeasterly approaching tropical cyclone. It is strongly requested that effects of tropical cyclones be identified as a hazard for the area and the project. Hazards of surf/surge and wind factors must be addressed.*

Response: Volume I, Chapter Three of the dEIS includes a brief description of the climate of Ka`u. On page 3-12, it states: *"Much of this rain falls during a few concentrated storms. The Ka`u District receives unusually heavy rains when winds turn southeasterly...flooding may occur..."* It is common knowledge that hurricanes, tropical storms, and cyclones can take place in the Hawaiian Islands, although they are relatively unusual. The Ka`u coastline is not uniquely susceptible to these tropical storms.

The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community. Structures can be sited, engineered and designed to satisfy these needs, as documented in the recent experience at Johnston island where toxic chemicals were stored in bunkers that withstood the force of Hurricane John. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms.

The dEIS is based on a conceptual plan, the facilities have not been designed. Even the facility locations and the facilities themselves are only one indication of what might be expected if a real project is developed. On page 1-5 of Volume I is a discussion of the limitations of the DEIS and further work required. The paragraph states, *"In many cases, the dEIS raises questions that cannot be answered with available data and/or project information...It is intended that these issues will be resolved in a supplemental EIS which will be prepared when an actual project is planned."*

While it is possible to build facilities to survive severe storms, they may be costly, which is a factor the launch vehicle organization will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is planned, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge. Some of the design and operational issues pertaining to tropical storm threats that need to be considered by a developer/operator are:

* Is there sufficient time at the first notice of a potential storm to protect a vehicle that is scheduled for launch and may be partially built-up?

* Can hazardous materials such as liquid propellants be stored in such a way as to survive a storm without the storage vessel being breached and allowing a potentially dangerous spill?

* How will solid rocket motors be protected during a storm?

These questions and other issues relating to severe storms will be addressed in supplemental environmental evaluations if and when a specific project is planned.

Comment: *The draft EIS does not address ground subsidence in any detail for the project area. This is perhaps not only the most serious hazard for the project but would also result in the most serious impact to people and the environment (uncontrolled releases of toxins). No mention is made in the [d]EIS on mitigating measures for this hazard.*

Response: Ground subsidence is discussed in the dEIS under geologic hazards and earthquakes (Appendix IIIA, page 11-12). This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Plate 2, Appendix IIIA). As stated on page 13 of the Appendix:

> *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment included in Appendix IIIA (page 2) notes:

> *"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up."*

The Acta report continues:

> *"...regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka`u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."*

Additional data regarding ground subsidence and cracking is presented in the Acta report describing specific historical events such as the 2 April, 1868 and 29 November,

1975 earthquakes (page 3). Furthermore, the ACTA report discusses the earthquake-induced ground failures (pages 4-6) including "extension and contraction failures (cracks)" and "coastal inundation resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are specifically addressed in the Acta Seismic Risk Assessment for the three "design" earthquakes under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS (Appendix IIIA, p. 18) recommends *"siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report"*. More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in Appendix IIIA of the dEIS. Specific mitigations mentioned include:

> *"locate hazardous facilities away from known geologic hazards; and*
>
> *"carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."*

Comment: *It should be noted that a more likely scenario on lava flows for the area would be of vehicle access to the project being inundated without much advance warnings and developing a situation where project would have to be abandoned by personnel for an extended time. Mitigation measures must address toxins left in the area which may then be threatened by lava flow. The concern is not only the project site but effects on chemicals that may pose a threat to [the] environment and people.*

Response: If an eruption were known to be imminent, or underway, some portable/hazardous items and sensitive payloads could be removed before being overrun by lava. Such eruption prediction or forecasting has been successfully implemented by monitoring magma movements using seismicity data (and listening for volcanic tremor, etc.).

The dEIS implicitly recognizes that lava inundation would result in catastrophic destruction of the launch facility. Such occurrence would effectively shut down the launch facility permanently. As stated in Volume II, page 8-4:

> *"If the lower Southwest Rift Zone of Kilauea should erupt, however, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."*

Detailed descriptions of specific possible losses to permanent facilities, such as destruction of propellant storage tanks, launch towers, and so forth, would be addressed in future environmental documentation once the project has been designed.

The toxic effects of chemicals inundated by lava that may pose a threat to the environment and people are expected to be less than the "cold spill" scenarios covered in the dEIS. As stated on page 5-128 of Volume I:

> *"Generally, spills involving unreacted hypergolic propellants pose the greatest hazard because the minimum vapor concentrations with toxic impacts are much below those required to sustain a flame. This means the size of a toxic cloud is potentially much greater than that of a flammable cloud. For equal amounts of released propellants, therefore, the potential for toxic impacts is greater [for a cold spill] than for fire."*

The thermal energy in lava would ignite the propellants and cause them to react, resulting in a "hot spill" as described on page 5-127 of Volume I. Reacted hypergolic propellants do not pose a toxic hazard, however, the fires could be a hazard to people and property. Fire damage would be expected in the event of catastrophic lava inundation and site destruction, with or without the involvement of combustible fuels.

Comment: *It is questioned as to how one can build to mitigate tsunami impacts. The mitigation should be to build outside of the inundation area.*

Response: Figure III-2.5 on page 3-31 of Volume I depicts the estimated tsunami inundation zone. As noted, only a small portion of the pad 3 area is within the tsunami inundation zone. The launch pad structure itself would not occupy the launch pad area as shown on the map, however, the perimeter may include a road or a gatehouse. The Conceptual Project Description (DBEDT, 1993) and the dEIS recommend that the launch structures be located in areas of at least 60 feet elevation, outside of the tsunami inundation zone. A rocket launch pad is typically elevated somewhat above grade on a large, usually reinforced concrete, foundation. Typical tsunami damage occurs by the strong hydrodynamic forces during the inundation and draw-down of the water which erodes the foundations of buildings and may cause additional damage by the impact of objects such as trees, boulders, vehicles, and parts of structures which are torn loose and thrust against erect buildings. The large foundation of the launch pad could be designed to rise above maximum credible tsunami run-up level, and be strongly anchored to bedrock (basalt lava flows) to avoid erosion at its base. More vulnerable parts of the launch pad would then be elevated above the potential tsunami run-up and the massive foundation would resist the hydrodynamic forces of the inundation. Corrosion effects of the salt water inundation would be resisted by regular maintenance procedures typical of facilities erected along the sea coast, where salt spray is an ever present corrosive agent.

Comment: *It is agreed that the unresolved issues must be addressed and resolved. It is disagreed as to when these issues are to be resolved. Risk assessment to harbors, population, and environment needs to be conducted as early as possible in the conceptual stage so decisions and mitigation measures are based on identified risks.*

Response: The dEIS identifies hazards and mitigation measures based on a conceptual plan. As stated on page 5-1 of Volume I: *"A hazard is defined as an intrinsic property or condition that has the potential to cause an accident or an undesirable effect."* Risks are usually defined in the context of casualty expectations, derived from the combination of the probability of an accident or failure occurring and the consequences of that event or failure to a system's operators, users, or its environment. Risk assessments involve the process and procedures of identifying, characterizing, quantifying and evaluating risks and their significance. The most widely used techniques are failure modes and effects analysis, event tree analysis, and fault tree analysis. The three complement each other, and when used together, help engineers to identify the hazards in a system, potential interactions between parts of a system, and the range of potential consequences. The interactions are particularly important because one piece of equipment might be caused to fail by another's failure to, for example, supply fuel or current.

If a quantitative risk assessment is the goal, the next step is quantifying the probability that any particular failure will occur in each mission phase. This probability may vary from phase to phase, because in some the critical piece of equipment may be functioning and in others it may be idle. When an accident involves the failure of one or more system components, its probability will depend in part on test data about the components' reliability under various operating conditions. Also to be anticipated are destructive outside forces, such as natural hazards or earthquakes. The chief purpose of a risk analysis - defining the stages of a mission, examining the relationships between system parts, and quantifying failure probabilities - is to highlight any weaknesses in a system design and identify those that contribute most heavily to risk. The process may even suggest ways of minimizing or mitigating the risk.

Again, the dEIS does identify within the context of a conceptual plan those processes that contribute most heavily to risk and suggests ways of minimizing or mitigating the risk. Until an actual project is defined, there is no way to quantitatively assess what the potential risks of a real project might be. For example, it is not known whether the proposed vehicle(s) will use solid, liquid, or a combination of propellants or in what quantities, or how many shipments will be made. Container design, ship and dock specifications, crane requirements for off-loading the stages or propellants, as well as safety features and procedures, are only a few of the factors that must be considered in a detailed risk assessment that can only be determined by specific project characteristics.

References:

Department of Business, Economic Development and Tourism, Office of Space Industry, 1991. "Project Description and Conceptual Facilities Layouts for a Commercial Rocket Launching Facility in the State of Hawaii (Interim Report)". Honolulu, Hawaii.

IEEE (Institute for Electrical & Electronics Engineering), June 1989. "Spectrum". Volume 26, No. 6.

X-Copy OSI
9/7/93

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September 1, 1993

The Honorable John D. Waihee
Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, 11th Floor
Honolulu, HI 96813

ENVIRONMENTAL IMPACT STATEMENT FOR COMMERCIAL ROCKET LAUNCHING FACILITY
KA'U DISTRICT
TAX MAP KEY 9-6-2:(POR.) 01-06, 9-10, 20, 28, 42-49
9-6-13:3, 5, 6 (POR.)

12-210

Please refer to our letter of October 4, 1989 to the Department of Business, Economic Development & Tourism for our comments.

We have no additional comments to offer at this time.

H. William Sewake
Manager

WA

copy - Mr. Takeshi Yoshihara, Deputy Director

... Water brings progress...

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Norman Olsen
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
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FAX TRANSMITTAL FORM

TO: Brian J. J. Choy

FROM: Alice Kawaha

DATE: November 22, 1993

SUBJECT: Comments on DEIS for Commercial Satellite Facility at Palima Point

NO. OF PAGES: 5 (Includes This Page)

FAX NUMBER: 586-2452

Stephen K. Yamashiro
Mayor

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November 22, 1993

The Honorable John Waihee
Governor of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, HI 96813

Dear Governor Waihee:

Comments on Draft Environmental Impact Statement (DEIS)
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, Ka'u, Island of Hawaii

We have reviewed the above-referenced DEIS for the commercial satellite launching facility at Palima Point and provide the following comments:

1. On page S-1, the EIS states "The State draft Environmental Impact Statement (dEIS) is based upon the elements of a conceptual plan rather than a specific project." What is conceptual plan versus specific project? The entire discussions in the ten volumes refer to a proposed launch facility at Palima Point. If there is no "solid" project proposed for the site, we recommend that the DEIS be withdrawn. If the decision is to continue to process the EIS, then we recommend that a detailed Supplemental EIS be processed in the future should a project materialize.

2. Many extended service satellites could, in the future, use radioactive source type power supplies, even non-military payloads. For this launch facility to comply with State law could make the project economics inviable.

3. The EIS should address what on-the-job training and specialized training programs will be available for local residents. A broad based technical training program offering specialized training in many areas for the local resident should be required as a part of this project. Anytime a large project such as this is sited in a foreign

country (and usually a third-world country), the government of that country usually insists that the developer provide extensive training facilities, such that guaranteed percentages of blue-collar, technical, and managerial jobs for the project will be met in a specified number of years. Hawaii as part of the U. S. should garner preferred treatment.

4. The figures of $3.7 and $4.0 million dollars net income to the County and State, respectively, for a project with gross operating revenues of $51.3 million are rather generous.

5. On page S-1, the assumption of full build-out/full development within 3 years after completion of permitting and land acquisition shows a completely unrealistic estimation of the future launch markets.

6. On page S-4, the EIS states, "The rocket propellants stored at the proposed launch facility pose a hazard to the local population and environment in the event that an earthquake causes a failure of containment." The paragraph further addresses on-site emergency response to reduce adverse effects. How will off-site emergency response be handled as the above statement indicates hazard to the local population and environment?

7. On page S-6, the statement "Assessment results that show that there would be no adverse effects even under the Hypothetical Worst Case conditions generally indicate that they would not be expected under any other condition." Using words such as those underlined in the above statement 'generally indicate' that there is no really solid evidence to back this assumption and hence are certainly suspect.

8. On page S-8 (Debris Effects), the statement that "....none of the debris footprints indicate an effect on the Kamehame Hill area, an area frequented by the Green and Hawksbill turtles" is hard to understand when two of the "UNRESOLVED ISSUES" listed on page S-15 show that "debris effects" and "debris models" are yet to be run for each specific rocket.

9. The second paragraph on page S-10, first states that radar energy emitted in the antenna "sidelobes" can cause interference with the optical/infrared and radio telescopes on Mauna Kea. However, the next sentence states the opposite. Then the following sentence states that the radar operating at Cape Kumukahi would interfere with optical/infrared operations. This seems contradictory and therefore, needs to be clarified.

10. On page S-10 regarding the Effects From a Southern Launch, the first paragraph says that it would take 7 hours to clear an exhaust plume from the field of view of the Mauna Kea Observatories (MKO) during normal conditions. Then, the next paragraph says that in the worst case it will take 7 hours. Again, this needs to be clarified.

11. On page S-10 regarding the Effects From a East Launch, the paragraph indicates incorrect information on the direction of the normal trade winds that blow for the most part of the year.

12. Regarding the above two sections referred to on page S-10, the statement "Launches will be restricted to times when the exhaust plume will be transported out of the field of view (sky above 15 degree elevation) within two hours of launch", is not reconcilable.

13. On page S-11 the paragraph on the "Social Impact" states, "Although development of the launch facility will predispose Ka'u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region." Please explain this statement.

14. On page S-11, the paragraph on the "Shoreline Recreation and Subsistence Uses" should also include the "controlled" public access as discussed in the Conceptual Shoreline Access Management Plan section.

15. On page S-12, the EIS states that the National Park Service (NPS) may not consider the proposed rocket launch facility as a compatible land use is a gross understatement of the issue. How has the NPS reacted to the proposed launch facility?

16. On page S-13, the EIS indicates that maximums of about 93dB sound level will be heard at Hawaii Volcanoes National Park (HVNP) visitor's center for several minutes. What about HVNP/NPS liability?

17. Nowhere in the table of contents for the 10 volumes of the DEIS is a project Critical Path Method (CPM) referred to. A complex project such as this, with very extensive permitting requirements should have at least a rudimentary CPM. For large projects, in today's world, project work flow planning starts at the conceptual design stage or the concept would never get off the ground.

The Honorable John Waihee
Page 4
November 22, 1993

18. It is completely unrealistic to expect that the project will be able to keep Hawaiian residents from night fishing within the PCZ.

19. On page 3-27, the EIS states "There is a strong possibility that the State-owned lands at the site are ceded lands." If the lands are found to be ceded lands, then it may open the door to a whole new "ballgame". The EIS should not look at only the proceeds that the State would receive. The ceded land issue should be included as an UNRESOLVED ISSUE.

20. On pages 10-1 to 10-3, the EIS lists the economic goals, policies, and standards of the Hawaii County General Plan. It also lists the courses of action for the Ka'u District. However, the document falls short of discussing the relationship of the project to the land use element as well as other elements of the General Plan. In addition, the EIS should discuss how the project will be consistent with and/or meet each goals and policies.

21. Listing the policies and plans incorporated by reference on page 10-3 does not provide the public a comprehensive understanding of what are the purposes and objectives of those policies and plans. Those plans may not be readily available to the public during the review period.

Thank you for the opportunity in providing comments on the DEIS document. Should you have any questions, please feel free to contact Alice Kawaha or Jim Moulds of this office at 961-8288.

Sincerely,

Virginia Goldstein

VIRGINIA GOLDSTEIN
Planning Director

AK

xc: Mayor Stephen K. Yamashiro
Mr. Mufi Hannemann

12-213

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Ms. Virginia Goldstein
Planning Director
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Goldstein:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services, Decision Analysts Hawaii, Inc., ACTA Inc. and Risk Science Associates contributed to the following responses:

Comment: *A supplemental EIS should be prepared when there is a real project.*

Response: We agree. As noted in the accompanying letter, the State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project. At that time a supplemental EIS will be prepared.

Comment: *The State ban on use of nuclear/radioactive materials could make the project inviable.*

Response: Most payloads launched by the type of rockets proposed for Palima Point do not include nuclear/radioactive materials. Nuclear propulsion systems are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size precludes any rocket currently capable of carrying deep space probes from being launched at Palima Point. Consequently, the ban should not significantly limit the number of potential launches from Hawaii.

Comment: *The dEIS should address what on-the-job training and specialized training programs will be available for local residents. A broad-based technical training program offering specialized training in many areas for the local resident should be required as a part of this project.*

Response: Job training is discussed in Appendix IXA (pp. 4-15 through 4-18 and 5-3 through 5-5). A firm commitment to on-the-job training by the Consortium and the various launch companies is provided for in the State Spaceport Management Plan (Appendix XE) and would be an expectation of the Authority which would negotiate the operating and site development agreements with the launch companies that comprise the Consortium. It is likely that this commitment would be obtained without difficulty, since it would be in the best interests of the companies to hire locally (Appendix IXA. pp. 4-11 and 4-12). Local hires offer advantages in that they are available immediately, do not require relocation funds, and the risk of their leaving their jobs is lower than it is for mainland hires.

A specific job-training program, however, should be developed after the job requirements are defined by the companies which would actually be participating in spaceport, and when the available labor force can be assessed and specific training needs identified.

The timing of spaceport with respect to the closing of sugar operations would affect the content of the job-training program. Many office staff, mill workers, and heavy-equipment operators have skills that match, or nearly match, the skills required

in spaceport jobs. Training programs will depend upon whether this pool of workers is still available when spaceport is hiring. Because Federal courts have declared residency requirements illegal, it is not possible to set aside a guaranteed percentage of jobs for local residents.

Comment: *Net revenues to the State and County appear high compared to estimated operating revenues.*

Response: Net tax revenues being collected by the State and County may appear to be high relative to the gross revenues earned by private companies, but this is because the taxes constitute a complete accounting of the revenues that would be collected by government, while the $51.3 million is only a partial measure of the business activity that would be generated due to the existence of the launch facility. In estimating the government revenues, a pyramid tax rate was applied to retail sales to account for intermediate sales (that is, a 5.5% excise tax rate was used rather than the normal 4%). In estimating the revenues received by businesses, however, intermediate sales were not included because this information was not needed in estimating tax revenues collected by government. Thus, the methodology for estimating tax revenues is correct - even though the estimate of business revenues does not include intermediate sales.

Comment: *The assumption of full build-out/full development within 3 years after completion of permitting and land acquisition shows a completely unrealistic estimation of the future launch markets.*

Response: The key words in the statement on the full build-out/full development scenario are after completion of permitting and land acquisition. Permitting includes completing all necessary agreements. After land rights and major development permits are obtained, an undetermined amount of time will be required to negotiate a host of major agreements, including: agreements among the Authority representing the State of Hawaii and the launch companies that form the Consortium (see Appendix XE, pp. 49 - 52), agreements among launch companies and users who would require launch services, insurance coverage and premiums, construction financing, long-term financing, etc.

Once construction begins (which could be some years after completion of permitting and land acquisition), it is expected that the launch facility would be capable of full operation within 3 years. The initial construction would include all facilities required for safe operation. Construction of some non-essential facilities, however, may occur later as the use of the launch facility increases. A fast construction schedule for the initial facilities would be dictated by the need to generate revenues quickly in order to begin paying debt service on the high initial cost of construction.

Comment: *How will off-site emergency response be handled in the event that an earthquake causes a failure of containment?*

Response: Off-site emergency response procedures for any event in which a spill or launch failure occurs resulting in hazard to the local population will involve the following (see page 5-136 of Volume I of the dEIS):

* A detailed emergency response plan involving on-site and off-site personnel
* Expansion of local fire-fighting capabilities and hazardous materials training
* An evacuation plan
* Expansion and possible relocation of Ka`u hospital
* A medical airlift plan

Emergency response capabilities of the proposed Spaceport facility are described on page 5-136 of Volume I of the dEIS. The Hawaii County Fire Department, which has chemical emergency response training, has responsibility for initial response. Additionally, the launch facility will have its own on-site HAZMAT team which will consist of personnel trained to deal with hazardous materials incidents. The facility will also develop an emergency response plan to respond to hazardous incidents within the facility or on its grounds.

The need for expansion of off-site emergency response services is also described on page 7-13 of Volume II of the dEIS:

> *"The proposed development would also require expansion of existing fire-fighting capabilities and additional personnel. Even though the Spaceport would provide on-site fire protection, the local fire department could be called upon for assistance during emergencies. Detailed contingency plans and appropriate training should address potential accidents that could occur at the Spaceport facility."*

On page 5-45 of Volume I of the dEIS it is stated that, in the event of a transportation spill, *"the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it."* Also, page 5-41 states that *"Typically, only a single chemical is involved in an accidental spill thereby minimizing the likelihood of an explosive reaction."* In the human health risk assessment (Appendix VIIIA), only a single chemical is assumed to be involved in a spill (assuming an accidental spill of one 55-gallon drum of hydrazine or one 300-gallon cylinder of nitrogen tetroxide). Evacuation of affected areas following a transportation spill is described on page 5-55 of Volume I of the dEIS. It is stated that *"Evacuation of areas along the transport route between Hilo and Palima Point may also be necessary in the event of a transportation accident that results in toxic spills or fire"* and that *"In the event of a serious accident, the only viable evacuation option is to move persons to a safe distance away from the accident site."*

Page 6-22 of Volume II of the dEIS indicates the need for the construction of an on-site fire station, a medical building, and a helipad: *"All on-site and some*

off-site infrastructure and other capital improvements required to develop and operate Spaceport will be provided by the Consortium. This will include interior roads, water development and a distribution system, drainage, collector sewers and trunks, wastewater treatment facilities, a fire station, a security building, a medical building, a helipad and hanger, etc."

The need to upgrade and expand existing off-site medical services is described on page 7-13 of Volume II of the dEIS:

> *"Currently, the health services in Ka'u are barely adequate. Because of the large size of the District and the distance to other medical facilities, the hospital and its personnel provide a wide range of immediate-need services. Even though the conceptual plan proposes on-site medical facilities, the development of the launch facility will require an upgrading of the Ka'u hospital and possibly other medical facilities plus a more elaborate and sophisticated medical evacuation system. The existing hospital does not have the capacity to treat the injured if a major accident should occur at the launch site. Victims would have to be transported quickly to medical facilities outside the District (e.g., Hilo, Kona). To mitigate these deficiencies, the launch site operator must be required to provide both emergency medical facilities and appropriately equipped helicopters and ambulances."*

If containment dikes and other structures on site are built to UBC 4 standards and response teams are in place, any emergency should be mitigable and manageable.

Comment: *No adverse effects under Hypothetical Worst Case conditions does not necessarily mean that lesser cases could not have greater adverse effects.*

Response: The purpose of inventing a Hypothetical Worst Case scenario is to determine what would happen if an accident occurred under the worst possible weather conditions. In reality, a launch would probably be postponed under those kind of conditions. If one postulates both that a launch would take place and that a catastrophe would happen, and the analysis shows that there would be no adverse impacts, it seems reasonable to conclude that there would not be adverse impacts under better conditions.

Comment: *How can it be determined that none of the debris footprints indicate an effect on the Kamehame Hill area if debris models have not yet been run for each rocket?*

Response: You are correct in pointing out that among the "UNRESOLVED ISSUES" is an identified need to consider more detailed analyses of debris patterns for each vehicle. The debris impact analyses performed by ACTA were intended to give a general idea of where debris would fall for both southern and eastern launches. ACTA used the debris impact calculation programs applied by the Cape Canaveral and Vandenberg AFB range safety offices to compute the distribution of debris expected to reach the ground at various abort times.

The primary concerns for potential impacts on the turtle nesting sites due to rocket aborts would be from burning solid propellant fragments and inert debris thrown from the destruct point as well as possible exposure of the beach and ocean surface to gaseous combustion products carried downwind from the explosion. Kamehame Hill beach area is located about .85 miles (4500 feet) southwest of the southernmost proposed launch pad. At this distance from the launch pad, the Kamehame beach area would be unlikely to be directly affected by any of the launch vehicle liquid propellants because the liquids are atomized and combusted during the abort or rain out near the pad area. Vehicle destructs which occur during ascent would tend to result in dispersal of unreacted liquid propellants as a mist transported in the downwind direction.

Figure V-3.6 of Volume I indicates that the Kamehame Hill area lies just at the edge of debris impact ellipses predicted for hypothetical Delta II launches along a southern azimuth. The results for Delta II vehicles, which carry the most propellant and therefore offer the highest potential risk, indicate that destruct actions at 15, 25, and 35 seconds into flight are expected to have 22 percent, 7 percent and 2 percent of the original solid propellant mass impact the ground respectively. The rest of the mass is consumed by combustion either before the rocket is destroyed or by burning during free fall back to the ground.

The debris "footprints" shown in Figure V-3.6 indicate that by 40 seconds into flight the debris patterns are falling over open ocean. Easterly launches, as shown in Figure V-3.4, indicate that the debris patterns could affect the costal zone toward the Volcanoes National Park. Burning solid propellant would not be expected to reach the ground after about 50 seconds into flight.

The foregoing discussion can be summarized by stating that there is a small likelihood that the Kamehame hill and beach area would be impacted by falling chunks of solid propellant and other debris during a rocket abort, especially if the abort occurred in the first 25 seconds or so of flight. The consequences of such an abort on sea turtles is speculative. The probability of a direct fragment impact on Kamehame beach is extremely remote due to the distance of the beach from the centroid of debris impact patterns and the small size of the beach. Nevertheless, if an actual project is proposed, the developer will consult with the U.S. Fish & Wildlife Service and the National Marine Fisheries Service to be sure that the mitigations are adequate.

Comment: *Statements on radar appear to be contradictory and need clarification.*

Response: Energy emitted in radar antenna sidelobes can interfere with the electronics of an optical/infrared telescope. Radar operating at Palima Point would not interfere with MKO but the same radar operating at Cape Kumukahi, a different site, could.

Comment: *Statements on effects from a southern launch of exhaust plume on MKO are confusing and need clarification.*

Response: The statements you refer to are explained more thoroughly in the dEIS (Volume I, Chapter Five and Appendix XA). The discussions presented example clearing times based on a sounding taken at Honuapo. The observed winds only went to an altitude of 56,000 feet but were extrapolated to 175,000 feet for calculation purposes. As a result, the clearing times are most likely very conservative because a low wind speed was used in estimating the transport times. Under the assumed conditions of wind speeds of 10 m/s at 50, km, the plume will be above 15 degrees - but below 17 degrees - for seven hours.

A south launch with winds from the south was considered the worst case scenario because it brought the plume straight over the observatories. The data from Barking Sands showed this condition may occur at the 20 km level with light wind speeds of 5 m/s. Under these conditions a plume clearing time of seven hours was also calculated but the plume was carried over the observatories, a condition very unfavorable for MKO.

Comment: *Statements on wind direction are wrong and need correcting.*

Response: The statements are correct. Part of the confusion may rise because wind direction and speed at the surface are not necessarily the same as those in the stratosphere and troposphere. Because of their importance in assessing the impacts of launch emissions, wind directions and speed are discussed in several places in the dEIS. Potential impacts on MKO from particulates in launch emissions are addressed in Volume I, Chapter Five, pages 5-145 to 5-156. The statement that covers the particular case is on page 5-150 where it is noted that the estimate was based on an actual sounding in May, 1989 that indicated northeast tradewinds between the surface and 9,000 feet and westerly zonal winds above 10,000 feet. See also Volume I, Chapter Three, and Appendix VB, Climate and Air Quality.

Comment: *Statements on launch restrictions are not reconcilable.*

Response: Because a potential significant impact had been identified in the analysis, and because there was very little data available for further analysis at the time of the dEIS, UH IfA requested very conservative mitigating measures. Subsequent to the publication of the dEIS, an expanded analysis of wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai.

The goal of the analysis was to determine the probability of favorable wind directions that would <u>not</u> carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis identified certain conditions where there is a relatively high probability of transport of a rocket plume into the field of view of the observatories. These conditions occurred during both south and east launch trajectories with the highest percentage of unfavorable wind directions occurring during an east launch. A copy of the report is attached.

The scope of the described analyses was limited to identifying the percentage of time favorable wind directions would be present. The wind direction analysis provides the first step in understanding the potential for favorable launch conditions. However, even with unfavorable wind directions, high wind speeds could produce adequate transport to clear the plume from the field of view within a short time. Further refinement of the analyses to include the wind speed and the correlation between winds at different altitudes is left to future tasks in the event the project moves forward.

The new results described in the attached report provide information not available during the preparation of the draft EIS. The analysis suggests that it may be possible to modify the mitigation to increase the probability of favorable launch windows without compromising astronomical observations. Specifically, it might be acceptable to replace the prohibition against launches when there is a southerly wind component with a stipulation that ..."there will be no launches when the wind would carry the plume above a specified elevation (e.g. 30 degrees) at any time, as view from the observatories." Also, the requirement that the plume be transported out of the field of view (sky above 15 degrees elevation) within two hours of launch might possibly be replaced with a requirement that ..."the plume must not be in the field of view for longer than two hours." This would mean that the two-hour clock would not necessarily have to start at launch.

Obscuration by plumes is a potentially serious problem for which the currently proposed mitigation (as stated in Chapter Five of the dEIS) is believed to be adequate. In the event the project moves forward, however, and refined analysis--as mentioned above--is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH IfA for approval.

Comment: *The statements on restricting growth are not clear.*

Response: We believe that retaining 10,400 acres in open space, with no development allowed, will restrict growth within that area. Please see the social impact section of the dEIS, Volume II, Chapter Seven and Appendix IXC for a full discussion of social impact issues.

Comment: *The discussion on shoreline recreation should include controlled public access.*

Response: Because this is a summary and not a detailed discussion, the paragraph seems to describe the situation adequately without further references. Please see the Conceptual Shoreline Access Management Plan in Chapter Two and Appendix XF of the dEIS.

Comment: *What is the National Parks Services position on the proposed project?*

Response: The National Park Service is opposed to locating the project at Palima Point. For your information, we have attached their comment letter and DBEDT's response.

Comment: *Will NPS be liable for noise from launches?*

Response: It is hard to understand how the NPS would incur a liability for the effects of an action that occurred outside its boundaries.

Comment: *A critical path should have been prepared and included in the dEIS.*

Response: A preliminary critical path was developed in coordination with the Hawaii County Planning Department as part of the site selection study prepared by Arthur D. Little in 1988. We do not think that a critical path for development of a commercial rocket launching facility is appropriate for this EIS because this is something that would be prepared by a potential developer and operator of the facility, not the State. As stated clearly on the first page of the dEIS, the dEIS is programmatic in scope and should be considered as a guide to State decision-makers in determining whether or not resources should be allocated to site acquisition, permitting and further analytical studies related to the commercial rocket launching facility initiative.

Comment: *It is unrealistic to think that Hawaiian residents can be prevented from night fishing within the PCZ.*

Response: The primary objective of this Conceptual Shoreline Access Management Plan (DEIS Appendix XF) is to provide access to and use of the shoreline area which falls within the PCZ, while at the same time insuring public health and safety during launches and other potentially dangerous operations, and protecting shoreline resources and the launch site facilities. Night fishing, by permit only, may be allowed at times when such use will not compromise the safety of those fishing or the security of the launch operations.

Comment: *The question of ceded lands should be included in the unresolved issues section.*

Response: The question of ceded lands is a statewide unresolved legal issue that is not limited to this project. As stated in Volume I, Chapter Three and Appendix IXE:

> *"In 1978, the State Constitution was amended to specify that the ceded lands were to be held by the State in a public trust for Native Hawaiians and the general public and to create the Office of Hawaiian Affairs (OHA) which was given responsibility for management of the public trust fund covering ceded lands.*
>
> *Since that time, there has been considerable controversy as to whether the State has complied with the provisions of the Act and the law in this area. OHA has made several claims, including filing a lawsuit which was appealed all the way to the Hawaii Supreme Court, seeking recognition of its right to the proceeds derived by the State from these lands. This issue remains unresolved, and OHA and the State are still trying it."*

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DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Barbara Bell
State Co-Chair
Hawaii Green Party
P.O. Box 3220
Kailua-Kona, HI 96745

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Bell:

We acknowledge receipt of the Hawaii County resolution. Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-220

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November 22, 1993

The Hon. Muliufi Hannemann
Director
Department of Business, Economic Development
and Tourism
State of Hawaii
PO Box 2359
Honolulu, Hawaii 96808

Re: Draft EIS - Spaceport

Dear Mufi:

As required by the DEIS commentary period, we are submitting the following for inclusion in the permanent record. As noted in our public testimony at a recent County Council hearing on the issue, we are strongly in favor of continuing and completing the DEIS process.

1. WHY A SPACE LAUNCH FACILITY?

While the space launch facility was always considered to be an intricate part of an overall Science Center development program, such measurements are not highlighted in the Executive Summary or body of the DEIS. Its relativity to other scientific research and development opportunities is a very important measurement in identifying launch capability and logistics. We suggest this discussion be included in the final record.

2. WHAT SIZE OF A LAUNCH FACILITY?

As the EIS presumes a "stand-alone" facility of unknown size, we are reminded of the task of the blind man trying to describe an elephant. We believe that the overly-technical and broad-brush approach to the space-launch facility described in the DEIS has left the document open to querry by any element that opposes any change. This is most unfortunate. Comparisons to existing projects of similar size - i.e., any commercial airport, or the Barking Sands PMRF, would give a truer, more practical description of project scope.

3. WHO WOULD BENEFIT?

Again, the overly-technical skills described do not give a clear picture of construction dollars, operations/maintenance job requirements, or the level of engineering expertise needed. Again, a commercial aviation facility or PMRF would provide an excellent comparison. Rather than paid staff advocates, we have suggested inclusion of UH School of Engineering, retired/former aerospace employees (island residents), and union leaders, together with community representatives. "Spin-off" high-tech industry should be involved.

4. WHERE SHOULD THE LAUNCH SITE BE LOCATED?

This is well-documented. As a preliminary step, we would suggest that the polar-orbit capabilities of PMRF be used as a pilot project base; since launch missions are on-going at that site (although controversial for some), a designated series of launches could be mounted through the Defense Conversion Program; once on-going, the transfer of a KNOWN successful project would be more efficent and timely. It would also serve to introduce the larger community to the personnel and procedures used by the aerospace industry, and over time, include local scientists, engineers, and op/maintenance workers in hands-on endeavors that speak volumes more than the DEIS.

5. WHEN SHOULD THE PROJECT BE OPERATIONAL?

In our view, the process has overcome the project scope, and has been politicized to an enormous extent. We believe that a safe, economically-viable option exists for launch capabilities in conjunction with other related science research projects. As these become clearly identified, and our labor-skill base grows, we can look forward to revisiting this issue. We do not see a local window of opportunity until early in 1995. However, as described above, we see considerable work ahead in the interim.

Thank you for the opportunity to submit these comments.

Yours sincerely,

Robert E. Bethea
President

12-221

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SEP. 30 1994

Mr. Robert E. Bethea
President
Hawaii Island Economic Dev. Bd.
1999 Ainaola Dr.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Bethea:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-222

Decision Analysts Hawaii, Inc. contributed to this response.

Comment: *Why a space launch facility? While the space launch facility was always considered to be an intricate part of an overall Science Center development program, such measurements are not highlighted in the Executive Summary or body of the DEIS. Its relativity to other scientific research and development opportunities is a very important measurement in identifying launch capabilities and logistics. We suggest this discussion be included in the final record.*

Response: On page 1-1 of Volume I, the dEIS contains a brief historical background of the project. As stated, the launch project is part of an overall statewide strategy to diversify the economy and *"Build on the existing space-related research at the Mauna Kea Observatories, at Haleakala, and the University of Hawaii."* While we agree that this discussion could be expanded, it has already been extensively covered in other documents such as the Arthur D. Little study, "Examining the Potential for Space Related Activities in the State of Hawaii," whereas the dEIS already takes up ten volumes.

Although the launch project is expected to tie in with existing scientific research, Hawaii's real competitive advantage is its geographic location, which enables both polar and equatorial launches. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the projected number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit. It is possible that future projects could create enough demand to require additional launch capacity, however, it is likely that demand would consist of mostly commercial payloads and a smaller percentage for scientific research.

Comment: *What size of a launch facility? As the EIS presumes a "stand-alone" facility of unknown size, we are reminded of the task of the blind man trying to describe an elephant. We believe that the overly-technical and broad-brush approach to the space-launch facility described in the dEIS has left the document open to query by any element that opposes any change. This is most unfortunate. Comparisons to existing projects of similar size--i.e., any commercial airport, or the Barking Sands PMRF, would give a truer, more practical description of project scope.*

Response: The task of describing the launch facility most certainly would have been much easier if it had been based on an actual project. Because there was no real project when the project description and the dEIS were prepared, the conceptual plan was based on a maximum capacity scenario. This means that rockets larger than those examined probably could not be launched safely from Palima Point, and the site could only accommodate up to three medium lift capability launch pads. The maximum capacity scenario was developed to test the environmental and safety constraints of the site.

If an actual project is proposed in the future, supplemental environmental analyses must be performed for that specific project. Any specific project is most likely to be on a smaller scale than the maximum capacity conceptual plan, however, it is also quite possible that most prospective projects would be somewhat larger than a commercial airport or the Barking Sands PMRF. The commercial airport comparison, while possibly similar in scale, does not account for the highly energetic propellants used for chemical rocket propulsion. On the other hand, the rockets launched at Barking Sands PMRF are only a fraction the size -- and generally pose proportionally less hazards -- than those considered for Palima Point.

Every effort was made to ensure that all volumes of the dEIS could be understood by the average reader. In addition, Volumes I and II summarize the main points of the technical appendices in a simplified manner. We agree that many of the issues are technical in nature, however, the EIS is required to address all of the comments raised during the scoping process, many of which cannot be seriously assessed without the application of physical, mathematical, and biological scientific methods. Assumptions and models used in the technical appendices are disclosed, so that anyone questioning the findings can perform the same calculations and arrive at the same results.

The dEIS does identify, within the context of a conceptual plan, those processes that contribute most heavily to risk and suggests ways of minimizing or mitigating the risk. Until an actual project is defined, there is no way to quantitatively assess what the potential risks of a real project might be. For example, it is not known whether the proposed vehicle(s) will use solid, liquid, or a combination of propellants or in what quantities, or how many shipments will be made. Container design, ship and dock specifications, crane requirements for off-loading the stages or propellants, as well as safety features and procedures, are only a few of the factors that must be considered in a detailed risk assessment that can only be determined by specific project characteristics.

Comment: *Who would benefit? The overly-technical skills described do not give a clear picture of construction dollars, operations/maintenance job requirements, or the level of engineering expertise needed. Again, a commercial aviation facility or PMRF would provide an excellent comparison. Rather than paid staff advocates, we have suggested inclusion of UH School of Engineering, retired/former aerospace employees (island residents), and union leaders, together with community representatives. "Spin-off" high technology industry should be involved.*

Response: The types and number of jobs that would be provided are discussed in Appendix IXA. Thank you for your comments on how to better communicate the potential economic benefits of the spaceport to the community.

Comment: *Where should the launch site be located? This is well documented. As a preliminary step, we would suggest that the polar-orbit capabilities of PMRF be used as a pilot project base; since launch missions are on-going at that site (although controversial for some), a designated series of launches could be mounted through the Defense Conversion Program; once on-going, the transfer of a known successful project*

would be more efficient and timely. It would also serve to introduce the larger community to the personnel and procedures used by the aerospace industry, and over time, include local scientists, engineers, and op/maintenance workers in hands-on endeavors that speak volumes more than the dEIS.

Response: During the site selection study commissioned by DBEDT to Arthur D. Little, Inc. in 1988, the Barking Sands PMRF was evaluated as a potential location for a commercial Hawaii launch facility. PMRF was not considered an appropriate location for a number of reasons. Firstly, PMRF could not support launches to equatorial orbits because rockets would fly over populated areas on Kauai. Secondly, the site is only big enough to launch the smallest rockets. Thirdly, and perhaps most importantly, PMRF is a military facility, owned and operated by the Navy. Any commercial launch venture operating out of PMRF would be subject to defense schedules and priorities, which could affect the viability of the launch, particularly if it is a time-sensitive mission.

Comment: *When should the project become operational? In our view, the process has overcome the project scope, and has been politicized to an enormous extent. We believe that a safe, economically-viable option exists for launch capabilities in conjunction with other related science research projects. As these become clearly identified, and our labor-skill base grows, we can look forward to revisiting this issue. We do not see a local window of opportunity until early in 1995. However, as described above, we see considerable work ahead in the interim.*

Response: The project will not become operational until an actual project is defined and approved by the appropriate regulatory bodies. This would not occur unless the project is deemed to be a safe and economically-viable.

Although about one third of the estimated number of spaceport jobs on the Big Island would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about two thirds of the jobs would be filled by Big Island residents, of which a third would be filled by residents of Ka`u (see Appendix IXA, pp. ES-2 through ES-5, 4-1 through 4-9, and 5-1 and 5-2). Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In comparison, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents. In addition, experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels--not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy, universities, airports, hospitals, computer companies, etc.

Furthermore, a firm commitment to on-the-job training by the launch facility Consortium and the various launch companies is provided for in the State Spaceport

Management Plan (Appendix XE, p. 24), and would be an expectation of the State, who would negotiate the operating and site development agreements with the launch companies. It is likely that this commitment would be obtained without difficulty, since it would be in the best interest of the companies to hire locally. Local hires would offer advantages to the launch companies in that they are available immediately, do not require relocation funds, and the risk of their leaving their jobs is lower than it is for mainland hires.

Job training is discussed further in Appendix IXA, pages 4-15 through 4-18 and 5-3 through 5-5.

12-225

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18 November 1993: 09:21 HST

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Development, and Tourism
P.O. Box 2359
Honolulu HI 96804

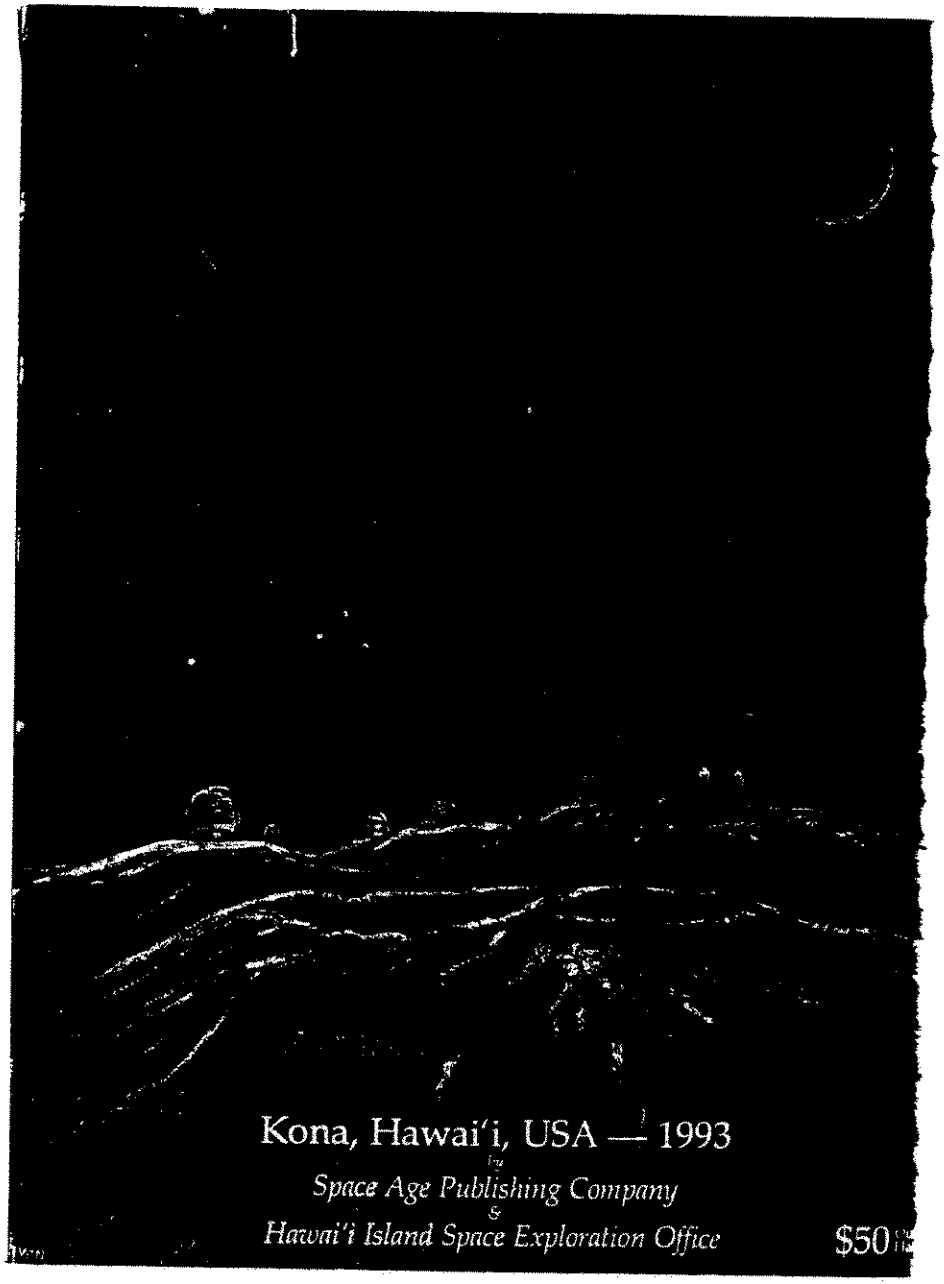
Dear Mr. Yoshihara,

The enclosed Pacific Aloha Spaceport Feasibility Study, which represents our thinking on Hawaii's future in the Space Age, also comprises our formal response the draft Environmental Impact Statement.

We submit it as per your request for public input on the dEIS.

Respectfully,

Steve Durst Leilehua Yuen Bill Fennie



POLYNESIAN VOYAGING SOCIETY

The Polynesian Voyaging Society continues to lead the way to a new Hawaiian future by exploring the accomplishments of the past. Since 1976, the society has taken on endeavors from reinventing ancient Polynesian navigational techniques to communicating with an orbiting Space Shuttle. This society of modern-day traditional seafarers is teaching young Hawaiians to navigate the reefs of cultural change with pride and confidence.

Pier 35, Honolulu HI / 808-531-7240

Hawai'i Island Space Exploration Office

The Hawaii Island Space Exploration Office seeks to facilitate space education and enterprise, and to disseminate space development information to those interested in environmentally sound, peaceful, commercial, scientific, and educational uses of space.

Now forming in Kona, West Hawaii

808-326-1910, fax 808-326-1825

Future Flight Hawaii 94:

Apollo,
The Next Generation

Return to the Moon

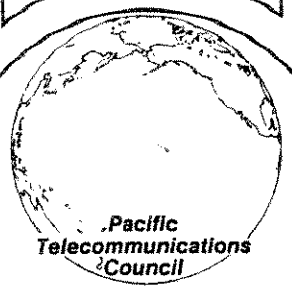
Future Flight provides hands-on space science experience with residential space camps using the natural and human-made resources of Hawai'i Island to simulate planetary missions. From snorkling to hiking lava flows, Future Flight demonstrates the fun of learning in a tangible way. The program's success can be measured not only by the international attention it has attracted, but by the number of students who return.

Office of Space Industry — DBEDT
PO Box 2359, Honolulu HI 96804
808-933-4038 (Hilo) / 808-586-2380

Dedication

This study is dedicated to the Dynamic Spirit of Hawai'i, and its People.

From Native Hawaiians to tourists, all here are wayfarers or descendents of wayfarers. This study is dedicated to that questing spirit of humanity which led humans to these islands and will lead humans to the stars.



Pacific Telecommunications Council

Pacific Telecommunications Council promotes interconnections between businesses around the Pacific Rim.

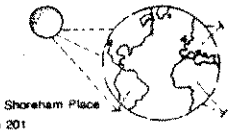
2454 S Beretania St / Suite 302
Honolulu HI 96826
808-941-3789

Front Cover

From Hawai'i to the Moon
— Henry Lyon

A rocket leaps into space from offshore, a trail of steam lit by the Moon, toward which it will voyage. Passengers watch an active eruption on Mauna Loa's southern flank, its red glow echoed by Hokule'a, or Arcturus, Hawai'i's zenith star. Astronomers study the heavens from the summit of Mauna Kea, highest point in the Pacific Basin.

Lunar Power System Coalition



5080 Shoreham Place
Suite 201
San Diego CA 92122
619-587-0970; fax, 619-458-1624

The Lunar Power System Coalition seeks to provide economically and environmentally feasible power to Earth through Lunar-based enterprise. Such an endeavor would benefit all of humanity.

UNITED NATIONS

Outer Space Affairs / New York NY 10017

The United Nations continues into the Space Age its role of facilitating international endeavors. A major participant in International Space Year 1992, the U N includes in its activities assistance to countries seeking to better the lot of their people through space development. Of this study, Nandasuri Jasentuliyana, U N Office for Outer Space Affairs director, wrote: "The Pacific Aloha Spaceport. . . seems worthy of further exploration. . ."

Aerospace States Association

130 State Capitol
Denver CO 80203-1792
303-866-2087, fax 303-866-5469

A consortium of state and private entities seeking to promote commercial development of space throughout the USA.

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Foreward

This independent study is being undertaken by Space Age Publishing Company and the Hawaii Island Space Exploration Office, now forming in Kona / West Hawaii. Its purpose — to explore the possibility, amongst others, of humans embarking from Hawaii to the Moon within 10 years — includes looking into some relatively idealized concepts. No government agency — federal, state, county, or local — bears any responsibility for this effort. As editors, the authors represent some 14 years of professional observation, research, and activity in space enterprise on, in, and from Hawaii and include one native Hawaiian. They have relied upon information from various sources, including scientists from several countries, acknowledged experts in various aspects of the launch industry, and government agencies, all of which are referenced in the text. Specifically, the subject of this study is truly *pacific* — no military business — and is in no way associated with the space launch facility concept being investigated / promoted by the Office of Space Industry organized under Hawaii's Department of Business, Economic Development, and Tourism.

This work is dedicated to the dynamic spirit of Hawaii and its people; to the unique social, cultural, and geophysical forces for which these islands are a junction; and to humanity's larger home — the Stars — seen spread across the black Hawaiian skies with such clarity that the Aloha State, with its world-class observatories, has become Earth's eye on the universe.

Kona, Hawaii, USA — 1993

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Introduction — Why Hawai'i?

High above the north Pacific Ocean, around 20° N latitude, Hawaii's zenith star Hokule'a — the 'star of gladness' known to westerners as Arcturus — glows with a dull red, as it has for unfathomable centuries. In the swells below, a small, double-hulled canoe — also named Hokule'a — moves slowly south. Wayfinder Nainoa Thompson and his Hawaiian crew relearning the skills and perception of their ancestors as they retrace the ancient route to Tahiti, using the stars as a vital guide. Since 1976 the Polynesian Voyaging Society, supported by the *kokua* — the caring assistance — of innumerable volunteers, has forged this link between Hawaii's past, its present, and its future.

Astronomer Carl Sagan's public television series *Cosmos* brought the vastness of the universe home to millions of viewers around the world — from the molecular structure of DNA to the 'backbone of night', the Milky Way galaxy. Accomplished space artist Jon Lomberg, who worked on *Cosmos* in addition to projects for The Planetary Society and the National Air and Space Museum, and others, designed The Planetary Society logo before he knew much about the settlement of the Hawaiian archipelago.

The well-known image shows a European-style galleon leaving the third planet from the Sun and voyaging into space after passing between the orbits of Jupiter and Saturn. These days, Lomberg tells audiences that if he had it to do over again the logo image would use a Polynesian voyaging

canoe. "If you sail West from Europe, it's almost impossible to miss North America," he says. The Polynesians, on the other hand, found their way to numerous groups of tiny islands hidden in the bosom of an enormous ocean — a far more impressive navigational feat.

The most important policy objective of the International Space Year . . . is to instill a new Space Age frame of reference in the thoughts and actions of governments and individuals."

–The late U.S. Senator Spark M Matsunaga, Hawaii

Dr Ben Finney, Chairman of the Anthropology Department at the University of Hawaii - Manoa, points out that "Europeans did not colonize the mid-Atlantic islands of Madeira and the Azores until the 15th century, 3,000 years after the stone age voyagers whose descendants were to be the first Polynesians reached the mid-Pacific archipelegoes of Fiji, Tonga, and Samoa." He reasons that the Europeans did not have any 'stepping stones' nearby to lure them into the ocean.

Finney goes on to note that the existence of the Moon and

Pacific Rim / Global Nations Involved in Space Enterprise

Australia is looking into a launch site of its own and is pursuing strong efforts to create a space technology support community at the university / industry level;

Indonesia relies heavily on space telecommunications to link the 13,677 islands of its far-flung nation and is engaged in a committed effort to move into techno-industrial parity with first-world nations;

China, potentially one of the economic giants of the 21st century, currently is gaining ground in the rocket launching arena with a sophisticated family of vehicles;

Russia, a world leader in space technology, is bound to transform humanity's access to space;

Japan participates on a regular basis in international scientific investigations using home-developed launch technology and high-grade electronics;

Canada leads the world in robotic manipulation hardware for space applications and has an active human spaceflight program;

Mexico has sent one astronaut into space aboard the U.S. Space Shuttle and is cooperating with the state of Florida on a series of university level sounding rocket launches;

The USA, a world leader in space development, is slowly moving toward a truly commercial space environment, in which private enterprise can play an increasing role.

In addition to the Pacific Rim nations, Europe, India, S America, Africa, and the Middle East — in roughly descending order — all possess space exploration and technology development programs.

Herb Kawainui Kane, an instigator in the project to build the Polynesian voyaging canoe Hokule'a, stands before her at Miloli'i harbor on Hawaii Island, top. Artist, anthropologist, and preservationist, Kane has been active in a Hawaiian renaissance. Hokule'a, a performance-accurate reconstruction of the great canoes which brought the forebears of Hawaiians to these islands, has been nicknamed the 'Spaceship of Our Ancestors', center. Nainoa Thompson, right, has devoted his life to reconstructing the astronavigational skills of his ancestors and leading young Hawaiians on a voyage of rediscovery (Photos Hawaii Maritime Center / Will Kyselka, 'An Ocean In Mind').

Long praised for their loveliness, and cherishing a unique multi-national heritage, the Hawaiian islands will offer a strategic location at the hub of the Pacific Rim during the coming century. For peaceful space enterprise, Hawaii's equatorial inclination, multi-directional launch capability, and mid-Pacific location make it a superior alternative. Ka Lae, also known as South Point (bottom), has seen a long history of air and space ventures (Images SPC / NASA / ERIM / U.S. Geological Survey).

other solar system bodies — like the long string of islands leading into the mid-Pacific from the Asian mainland — will allow humanity to develop the skills it needs to eventually travel to the stars. "If the Earth was the only body orbiting the Sun, then migration into space might never occur, or would be slow in coming. There would be nothing between us and the nearest stars to entice us from our lonely planet, and allow us to learn how to live extraterrestrially," he writes.

Geography, Geography, Geography

Arthur C. Clarke, the renowned author of *2001: A Space Odyssey* and *2010*, writes that he has no strong feelings about a Hawaiian / American / Global Pacific spaceport. "I'm not sure when and if we will need any more spaceports, but certainly Hawaii would be an excellent site from almost

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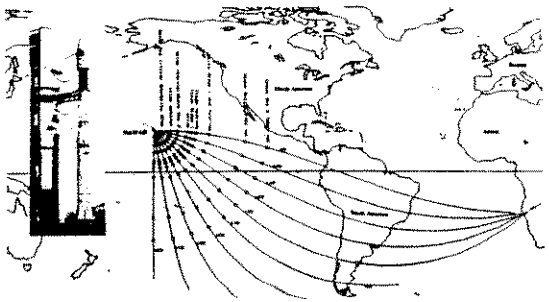

Orbital trajectories from Southern Hawaii, ranging from 18° to 98° relative to the equator, offer attractive options for government and commercial users. Rockets similar to the Ariane 4B (inset), could be among the first to lift payloads from the waters off Ka Lae. Sounding rockets will be able to collect data on some of the world's least human-affected portions of the atmosphere (Artwork Hawaii Office of Space Industry / Arianespace SA).

almost all points of view except the minor disadvantage of latitude and lost delta-V."

Equatorial Orientation. Located at just under 19°N latitude, a Pacific Aloha Spaceport would be well north of the equator, the most economically efficient launching latitude. Every degree of latitude away from the equator results in a loss of approximately 1.8 percent payload capacity to orbit.

On the other hand, a Hawaii site offshore Ka Lae — also known as South Point, the southernmost point in the USA — would be well south of the two major American launch facilities — NASA Kennedy Space Center / Cape Canaveral, Florida, and Vandenberg AFB, California — while still operating under U.S. law.

Bi-directional Launch Capability. For commercial activities, there is a distinct and significant advantage to working at a site that can support launches to any number of orbital inclinations. Companies trying to meet the needs of a variety of users can consolidate their operations instead of having them split between two coasts 5,000 km apart, according to Jim Bennett, a California space technology consultant and former President of the American Rocket Company. Amroc has shown great interest in a Hawaii launch site.

Truly Pacific Means Exactly That — No Military Business

Mid-Pacific Location. Centrally located as a natural bridge between western 'information society' countries and the emerging industrial powerhouses of Asia — including Australia, China, Indonesia, Japan, and Russia — Hawaii's location and history make the islands a natural setting for international, trans-Pacific, and global ventures. Already a travel destination for many of the world's vacationers and conventioneers, the same ease of access can be utilized by launch providers and their users.

History

The general area currently under consideration for a Hawaii space launch facility — the southernmost portion of the Ka'u district on the island of Hawaii — has been used to support military aircraft, space tracking, and rocket launching activities since at least the 1930s. Documents from the Air Force and from the 30th Space Wing History Office sketch an admittedly austere and sometimes contradictory picture of government interest in the area.

In 1941, the U.S. Army Air Force used a landing strip at 'Morse Field' about 2 miles north of South Point as a stopover to refuel trans-Pacific shipping. After the Japanese attack on Pearl Harbor the facility was destroyed to prevent it from falling into enemy hands.

Between 1958 and 1962, the Navy used a 6.5 acre plot in the same area for a telemetry receiver station. When the Navy turned the facility over to the Air Force Western Test Range in 1965 it was redesignated the South Point Air Force Station. The station was not used until 1971 when a series of sounding rocket launches supporting the HAVE LENT program took place, in cooperation with the Air Force Maui Optical Station. A total of 8 launches occurred: three in 1971, two in early 1974, and another three in early 1976. The station was then deactivated, and the rocket launcher was removed in 1979.

These launches employed a three-stage solid rocket called the Nike Hydac, with a trajectory 130 nautical miles northwest. They were supported by 15-20 persons. According to a government document, "There were no missile mishaps or chemical spills associated with the HAVE LENT program. There was never a need to conduct environmental monitoring; the Air Force was careful to maintain the integrity of the site."

Resentment occurs when people of a culture which does not practice Aloha . . . keep making 'withdrawals' from the Aloha account and make few, if any, deposits.

The National Oceanic and Atmospheric Administration used the site to conduct a hydrograph research project for three months in 1979. In 1981, the Army Corps of Engineers turned the land over to the U.S. Government General Services Administration.

According to an Air Force document, "A 1979 military property study stated that South Point AFS consisted of 11.8 acres of land owned in fee simple plus utility easements covering 21 acres of land. The station was divided into two parcels located about 1.5 miles apart, containing approximately 5.9 acres each, with one site serving as the main operations area while the other was used for a boresight tower."

In 1960, Parsons Corp completed a study for the state planning office which recommended the summit of Mauna Kea as a potential rocket launching site. That suggestion found a well-deserved black hole and vanished. The mountaintop instead was developed, after no little controversy, into what has become the world's leading astronomical center. It stands as an example *par excellence* of a truly pacific space enterprise.

Recent, non-military, inquisitiveness about the Ka Lae area

A Critique of the Hawaii State Government Effort

I have serious reservations about the idea of a launch facility located on the Big Island [Hawaii Island].

Let me first state that I am no opponent of the space program. On the contrary, my career for the last 20 years has been closely associated with astronomy and space, and I have done contract work for NASA on many occasions. I believe that the exploration of space provides many important benefits to every person on Planet Earth.

Jon Lomberg

My skepticism about the wisdom of locating a launch facility in Hawaii is based on several concerns.

I have never heard a persuasive argument that there is sufficient market for launch services to warrant the tremendous investment required to prepare a launch facility. On the contrary, it seems to me that there is greater competition among the existing commercial launch facilities and services for the market. Russia is beginning to compete with their very impressive fleet of vehicles. The Chinese have an active program of commercial launches from their facilities. Even the U.S. is beginning to talk about using existing military launch facilities at Vandenberg for commercial purposes, in an effort to keep that facility operational in a time of shrinking military budgets. Clearly the market for launch facilities will continue to be very competitive. There is no reason to believe that a Hawaii launch facility would win this competition.

The reason this concerns me so much is that the misguided effort to locate a spaceport in Ka'u on the Big Island posited a demand for such a launch facility. The original belief was that contractors would be beating a path to Hawaii, begging for permission to invest huge sums to build on the land C. Brewer offered to provide. That never happened. Indeed, the State of Hawaii found itself spending more and more money on things like feasibility studies, Environmental Impact Statements, etc., that would normally have been paid for by the contractor / developer. Proponents of the spaceport concept had powerful enough allies in the state government that budgets were made available for these attempts to move the project forward. I see a spaceport as being a rathole that could swallow up billions of dollars in state funds and never pay back the money invested. Apart from all my other concerns, it seems to me crazy to promote a project that is so expensive and so potentially disruptive to the community in which it is located without being very sure that the financial return would justify the effort.

Certainly, the burden of proof falls on the proponents to establish an economic case for permitting a launch facility. In a free market the clearest proof would be the arrival of developers, cash in hand, eager to build the site because they feel it would be profitable for them to do so. Until that happens, the economic case for the spaceport is very weak.

Even if the idea were a good one, the way DBED and the OSI have handled it has been so poor, so insensitive, and so deceptive that it would, at this point, take a tremendous effort to overcome the resistance and skepticism of the residents of Hawaii [island]. For example, there is serious question about the integrity of the EIS, since the original group contracted to prepare the EIS was fired. Rumor has it that the change of contractor was because the original company found some serious safety and environmental concerns. An honest and open public discussion of the EIS, with full disclosure of the draft report of the original study, should be held before any further development is considered.

The State also proposed that the launch facility be exempt from many of the rules and guidelines that apply to all other residents and companies in Hawaii. It is not too much to state that due process might be denied those people whose lives or businesses were disrupted by the activities of the launch facility. This issue also must be addressed before any further development takes place.

And there is serious concern among many that the real purpose of the launch facility would be to serve the needs of the military. There is serious doubt about the size of even *that* market anymore, but it is possible that military launches might be a substantial fraction of the available business. Once a launch facility is built, there are many ways in which "national security" or the "national interest" might be invoked to permit military launches, whatever declarations, resolutions or statements of intent had been adopted by local or state governments.

Finally, it seems to me as a resident of the Kona Coast that the sentiment among people who live on this island has been generally negative. Serious questions have been raised about safety issues and disruption of the existing community and lifestyle. I am not satisfied with the way the state, DBED, and OSI have responded to those sincere concerns of the people who actually live here. The way the state has handled this concept thus far gives me very little confidence in their ability to proceed in a responsible way that will integrate the facility with the existing community.

Pacific Aloha Spaceport Concept, Hawaii, and the Cosmos

It is very naive to think that a 'Pacific Aloha' spaceport, as you [the authors] call it, could be begun from scratch as a new effort unrelated to the current OSI and DBED proposal, especially because the current head of DBED is one of the originators of the spaceport concept. In your formulation of the concept you tossed off in a phrase that the facility would be safe and non-military. But apart from the economics, these are the most serious and contentious concerns. It is hard for me to see how anybody could give assurance that the project would be safe and non-military. The history of government's ability to keep such promises is not inspiring.

Until a much stronger case could be made for the launch facility and until public opinion responds to this with a more positive endorsement of the concept I remain skeptical.

Hawaii can indeed participate in humanity's progressive cosmic awareness. The ever-growing collection of world-class observatories atop Mauna Kea represents the proper way that a safe, clean, scientific, and economically sound installation can be welcomed by the residents of the Big Island. The idea expressed in a recent *Space Calendar* to have a campus of the International Space University here is another good idea. And we have yet to take advantage of the educational opportunities afforded by the astronomical, biological, and geological natural sciences in visitor centers, educational outreach programs, Art Kimura's Future Flight program, and the like. These, not spaceports, represent the best way that the aloha spirit can be combined with the exploration of the cosmos.

Jon Lomberg

Honaunau, Hawaii

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began with a visit by former astronaut Donald K 'Deke' Slayton in May 1982, who expressed an interest in establishing a commercial launch facility. Local opposition and a lack of state government support doomed the project.

In December 1986, newly elected Governor John Waihee — following up on an offer from J.W.A. 'Doc' Buyers, CEO of C. Brewer and Co. — picked up some of the pieces of the Slayton initiative and turned it into a State of Hawaii project designed to draw investors into the first truly commercial launch facility in the USA. Buyers offered to donate 500 acres of company land in Ka'u to anyone willing to build a spaceport, asking only that it be named after Hawaii Island-born astronaut Ellison Onizuka, who perished in the *Challenger* disaster.

After several years of study, the governor selected retired Admiral Thomas Hayward, former U.S. Chief of Naval Operations, to be his space advisor — sometimes referred to as 'space czar' — and to begin the hunt for big money to build an elaborate facility (costing an estimated $400 million) that would support everything from a Scout rocket to a Titan 3 booster.

Public support for the effort has been virtually invisible, consisting mainly of state government and business interests who keep a low public profile. One exception has been the two Oahu daily newspapers, which, from a remote and safe distance, have been cautiously supportive. Opposition, perceiving the effort primarily as a 'Pearl Harbor' initiative, has been intractable, vocal, and increasingly organized, although sometimes foolishly misinformed and needlessly inflammatory.

Finally, Aloha

The man who 'wrote the book' on Hawaii, as it were — James A. Michener — directly conveyed his support for the Pacific Aloha Spaceport Feasibility Study. Although current obligations prevent him from participating, his novelized study of the Aloha State's cultural dynamics goes a long way toward revealing some of the imponderable assets Hawaii could bring to space exploration.

Located in the center of the Pacific Hemisphere, Hawaii is an intersection and a dynamic crucible of Asian, Polynesian, Western European, and American culture. Three generations of Japanese, Chinese, and Filipinos exert a profound effect on the cultural and political mores of the Hawaiian islands and create natural ties to numerous Asian homelands. Their interaction — and that of Americans and Europeans — with the indigenous Polynesian people of the islands has created a unique amalgam which Michener dubbed, 'The Golden Man.' The ancient Polynesian principle of Aloha underlies this singular ideal.

Aloha is a way of life which encompasses specific rights and responsibilities. It was developed by a seafaring people as a survival tactic in a harsh and unforgiving environment.

The concept of Aloha is often misunderstood as a 'let's all love everybody and be happy' attitude. Such a definition trivializes one of the foundation stones of Hawaiian culture.

Aloha also is often defined simply as 'love.' Again, this falls far short of the complexity of the word. One can 'love' a new car. Aloha is reserved for that which can reciprocate love.

The word 'Aloha' is used as both a greeting and a farewell. To use it as a greeting implies that, upon meeting, the individuals involved take responsibility for each other's welfare and will assist and support each other in whatever endeavors they should undertake while together.

The ancient rhythms of traditional Hawaiian hula — the soul of Hawaii's people — evoke the rhythms of the lunar cycle. For generations Hawaiians, as most cultures, have followed the progress of the Moon through its phases and incorporated them into their lives. The awesome thunder of human endeavor moves the race forward to the stars — 'Imua I Na Hokui' (Artwork Hotel King Kamehameha)

As a farewell, it carries the wish that the support which has been given will be sufficient to see the wayfarer to another safe haven, *and* that the recipient of the support will pass on the Aloha which was received.

In a purely pragmatic, utilitarian sense, Aloha is a kind of bank account, or insurance policy. By fostering 'deposits' of aid and support into a cultural 'bank account,' Aloha ensures they are available at a later time when needed.

Imbalance and resentment occur when people of a culture which does not practice Aloha, at least not in the same way, keep making 'withdrawals' from the Aloha account, and make few, if any, deposits.

Aloha is Hawaii's most valuable gift to the modern world. Under the pink hula skirts, flowered shirts, and plastic leis, Hawaii has preserved, and continues to nurture, Aloha. It is here and, understood for what it truly is, represents an inexhaustible export item which can improve the quality of life for all.

'Exporting' Aloha to as much of humanity as possible, and to the cosmos, is intrinsic to the Pacific Aloha Spaceport concept.

Pacific Aloha Spaceport

Five principal characteristics define the Pacific Aloha Spaceport envisioned in this independently funded study and differentiate it from those described in other, government sponsored, works. Within these parameters, there should be room to meet the needs of a variety of users, from students operating low-budget, educational sounding rockets, to scientists and researchers investigating microgravity, to for-profit commercial ventures, to an eventual return of humans to the Moon for good, and beyond.

In Nature, The Pacific Aloha Spaceport is envisioned as truly pacific *— ie, no military business. The* **Destination** *for missions originating at the facility would be first* space and the Moon, *followed by worlds beyond. The* **Payload** *to be launched will be* humanitarian – commercial, *consisting firstly of humans and their cargo. Extended economic feasibility will be developed through profit-making endeavors. A* **Location** offshore Ka Lae *is suggested for several important reasons which will be examined later. Finally,* **Technology** *will include* advanced propulsion systems *available today which can provide truly clean and safe access to orbit.*

Nature: Pacific

After a long period during which military business has dominated the nation's space program, dedicating a rocket launching facility to peaceful and humanitarian aims may be seen by some as naively starry-eyed. Yet, humanity's future and its endeavors in the solar system depend no less on the principles upon which space exploration will be founded than on technological capacity.

The Pacific Aloha Spaceport concept does not have any argument with military necessity. Likewise, the highly touted 'economic feasibility' which is becoming so popular after the gratuitous excess of the 1980s cannot be denied. But neither consideration should be a deciding factor in a watershed venture as awesome as the exploration and settlement of the solar system and eventually the cosmos.

Speaking to the first Pacific ISY [International Space Year] Conference in 1987, Hawaii Senator Spark Matsunaga, founder of the U.S. Institute for Peace, predicted that in the process of meeting the demands of the space age, "the individual will graduate from self-inflating adolescent fantasies of heroic dominance and acclaim to more mature modes of social behavior, modest and proportionate."

With all of the orbital capacity on this planet — most of which is under the control of military authorities in one nation or another — it should not be extraordinary to consider that one spaceport be dedicated solely to peaceful space activity.

Commercial Advantages

Commercial launchers have been complaining about the problems of using a military / government facility for years. Vandenberg Air Force Base in California is going to great lengths to clean up its reputation and entice commercial launchers into using its facilities. Basically, a commercial user is at the mercy of national security. If the Air Force decides it has to launch a back-up Global Positioning Satellite on a priority basis, the commercial flight is bumped. In the space industry those kinds of delays are measured in hundreds of thousands of dollars.

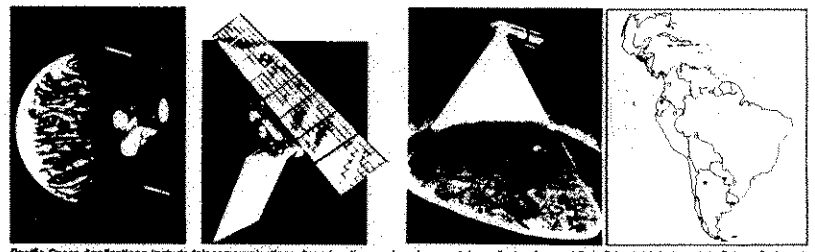
While the State of Hawaii proclaimed its effort as primarily commercial, and therefore free from the difficulties associated with Vandenberg or Cape Canaveral, the state wasn't about to turn away the lucrative business of putting Department of Defense payloads into orbit — including thousands of 'Brilliant Eyes' satellites that the Star Wars people were pushing.

A Different Kind of Benefit

But, for all the income and associated economic benefits to be gained, opening a launch facility to military payloads alters its character completely. A spy satellite or defense communications payload has to be protected. Instead of being open, inspiring, and uplifting — a transportation node to exciting and unusual destinations — the same facility becomes closed, defensive, and suspicious.

Humanity's future and its endeavors in the solar system depend no less on the principles upon which space exploration will be founded than on technological capacity.

The name Pacific Aloha Spaceport was selected not only due to the location of the proposed facility, but to describe its nature, truly pacific: tending to reduce conflict; peaceful; calm. Truly pacific uses include exploratory, scientific, educational, and com-



Pacific Space Applications include telecommunications, broadcasting, and environmental monitoring from orbit. Left to right, Indonesia's Palapa-C; Japan's Earth Resources Satellite 1; China's joint-venture AsiaSat-1; and the Latin American footprint for PanAmSat-1. The next PanAmSat will provide Pacific Rim coverage (Artwork Hughes, NEC, Alpha Lyracom).

mercial missions and provide a framework for international cooperation.

Hawaii could use the experience it has already developed in welcoming people from many cultures to provide a working destination for the world's scientific elite. With a local human infrastructure providing management and technical services, and speaking a variety of languages, scientists from around the world would work in a warm and hospitable environment — socially as well as physically.

The Pacific Aloha Spaceport could be a scientific and technical focal point for a new era in space exploration.

Destination: Moon and Beyond

The Pacific Aloha Spaceport concept is designed to support a return to the Moon, for good, around the year 2000. The support would not likely be launch services for the tons of cargo that will need to go into orbit to accomplish the mission, but as an embarkation point for the people involved.

Astronauts Armstrong and Aldrin trained for their Moon mission on Hawaii island. The late Hawaii Senator Matsunaga noted that the Apollo astronauts "trained on the dry lava flows of Kilauea and Mauna Loa Volcanoes . . . whose surfaces are similar to those on the Moon. Nearby on Mauna Kea, planetary geologists learn about Mars. The red oxidized soil on Mauna Kea is similar in composition and in its formative processes to the soil on Mars, and the stark, deflated terrain near the mountain's summit, with its scattered boulders, appears almost identical to a martian landscape."

The Senator wanted to see an International Space Camp and Science Center on Hawaii Island, an eventuality that would work in synergy with the Pacific Aloha Spaceport idea. His vision points to one of the central assets Hawaii brings to the Space Age: the culture of Aloha and its global applicability.

The Lunar Imperative

The Apollo program of the 1960s and early 1970s stands as a remarkable testament to human imagination and innovation. The images of astronauts romping around on another world — sometimes quite playfully — stimulated the idealism of a generation. Not without reason, they saw that anything is possible through peaceful human endeavor. Since the last human departed on 14 December 1972, the Moon has haunted the night sky as a reminder of vast territories and potentialities to be explored.

William R. Hawkins calls attention to Britain's 'lost century' — a period of 112 years between the time it learned of the New World and the establishment of its first settlement at Jamestown. A generation after Apollo, "the United States seems well into its own 'wasted century' of space exploration. . . . Progress was once assumed to be the natural destiny of the United States," he wrote in the *Huntsville Times*. "The country is the product of past exploration. Pushing back frontiers, whether geographical or scientific, has been a defining characteristic of Americans."

An ardent nationalist, Hawkins points to aggressive programs by Japan and Europe and adds that if an American "spirit to excel" does not show itself, the footprints on other worlds in the 21st century "will belong, along with those worlds, to others."

The Pacific Aloha Spaceport idea supports an international and cooperative approach, more along the lines suggested by Senator Matsunaga and others.

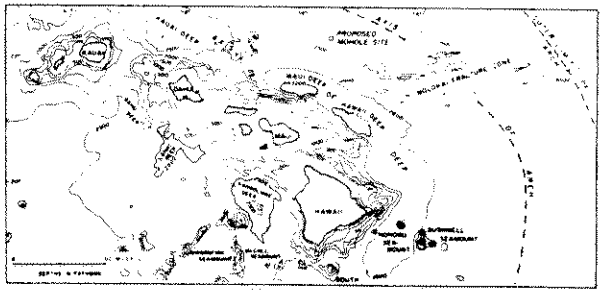
Feasibility

Dr. Paul Lowman, a scientist at NASA Goddard Space Flight Center, believes that once a return to the Moon is disengaged from a Mars mission it becomes a very feasible objective. "The manned exploration and settlement of Mars, however fascinating and challenging, is simply not going to be started in this century. Fortunately, there is a much closer planet only three days away. Return to the Moon, and establishment in stages of a lunar outpost, is clearly the logical next step unless we plan to abandon manned space flight altogether," he wrote to colleagues in May 1993.

A Lunar Far Side Observatory could take advantage of existing craters to support a large parabolic dish. The Moon's lower gravity would permit lighter support structures than those required for Earth-based telescopes. Science from the Moon would benefit all humanity (Artwork Doug McLeod and Mark Dowman / NASA).

Lowman adds that an Atlas Centaur rocket such as those used on a regular basis to launch communications satellites could place a 400 lb. robotic rover on the lunar surface. The rover could be used by university students to study not only lunar geology but the methodology of robotic research. Hawaii participation in such a program would expose its youth to the very latest world class scientific research.

General Dynamics — manufacturer of the Atlas rocket — is pushing an 'Early Lunar Access' plan that could place a crew on the Moon for a one-month stay by the year 2000 for under $10 billion. That's less than the redesigned Space Station *Freedom*. The General Dynamics plan relies on the Space Shuttle and Titan rockets, much larger than those envisioned for the Pacific Aloha Spaceport. But there is no reason why crew could not eventually be launched from Hawaii.



The Ocean Floor surrounding the Hawaiian Islands reaches depths of 800 meters and more. In such depths, a transportable platform may be more feasible than one which is permanently moored (Artwork University of Hawaii Press / University of Hawaii Institute for Astronomy).

Rationale

Lowman, in a presentation to the Low Cost Lunar Access Conference in May 1993, stressed the importance of the Annapolis Astrophysics from the Moon Workshop, the proceedings of which "[amount] to a 650-page endorsement of the scientific value of Moon-based observatories." Astronomical observations could begin from the very first lunar landing, by deploying small optical-infrared telescopes, Lowman notes.

> *"Return to the Moon, and establishment in stages of a lunar outpost, is clearly the logical next step unless we plan to abandon manned space flight altogether."*
> *—Paul D Lowman, NASA Goddard Space Flight Center*

The European Space Agency has published a large volume, 'Mission to the Moon' detailing the scientific rationale for European participation in a Moon mission. Included are questions of science relating to the Moon itself; to using the Moon as a platform to study the Earth, the Sun, the solar system, and the cosmos; and to life science questions for extra-planetary life support systems.

Science from the Moon, ESA reports, "takes advantage of the stable lunar ground, its atmosphere-free sky, and, on the far side, its radio-quiet environment. . . . Two techniques that can make unique use of the lunar platform are ultraviolet to submillimeter interferometric imaging, and very-low-frequency astronomy."

In addition to science, economics could play an important role in the return to the Moon. The Lunar Power System Coalition co-founded by David Criswell and Dan Greenwood, is lobbying strongly for research into the possibility of beaming energy from the Moon to Earth. The energy would be gathered on the Moon using solar panels and then transmitted via microwave or laser to Earth, where it could be used without burning fossil fuels. If LPSC is successful in their mission, a return to the Moon probably would include a major international commercial venture.

According to LPS co-inventor David Criswell, "Energy and power needs in the 21st century and limitations of terrestrial power systems are pushing humanity to consider acquiring solar energy in space by using the resources of the Moon. If solar power can be economically accessed in the next 50 years using the resources of the Moon then the health, wealth, and prosperity of humanity can be extended for several more centuries. Mankind can also use solar power from space to provide new net energy to the biosphere and, if desireable, restore the biosphere to its pre-industrial state."

Start Now

Benefits to Hawaii, the USA, and the world from an active lunar program go beyond economics and international cooperation. The establishment of a lofty goal literally will raise the sights of all who participate in the endeavor to leave the home planet and reach out for worlds beyond. That vision will extend to Hawaii's student body, connecting the ancient past with the unforeseeable future.

For those who choose to look toward the Earth, a lunar perspective will affirm that we are of one world, and must care for and preserve our island in space. Hawaii, with its island culture and experience in integrating many different cultures into a blend with an island perspective, could provide a leading role in developing a global attitude that we are, indeed, all caretakers of 'Spaceship Earth'.

Payload / Cargo: Humanitarian – Commercial

Humans would be the first priority of the Pacific Aloha Spaceport. A human mission beyond Earth orbit from Hawaii would be a fitting sequal to the original voyages of discovery which brought the forebears of the Hawaiian people to these islands.

Every culture has a legacy of discovery that it looks to with pride. That fact should remind us that the voyage is never over, and another horizon beckons. Denying that call forward denies one of humanity's fundamental urges.

The ancestors of today's Hawaiians set out in great double hulled canoes, taking along not only supplies for the immediate voyage but also plant and animal stock which would become progenitors of new populations in the new world toward which they were sailing.

They also brought with them a sophisticated social system, with complex rules to smooth interaction between individuals and groups.

Today, this tradition of exploration has lessons for a spacefaring

people. If we are to voyage successfully out from our island Earth into space, we must utilize the experience of those who have gone on their own voyages before us. Learning the appropriate technology is only one part of the task. Humans must also develop appropriate social structures and strategies capable of enhancing cooperation between the individuals and groups which will work together to create a spacefaring civilization.

Sounding Rockets

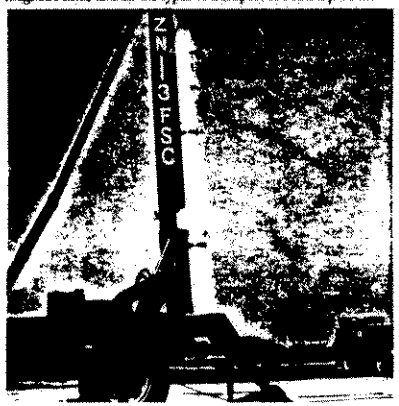
Hawaii is a premier location for scientific activity, including deep-water ocean studies, geology / volcanology, and world-class astronomy. What will eventually become the Pacific Aloha Spaceport could begin with scientific sounding rockets and payloads designed to answer various questions of humankind, with the goal of sending the most precious payload, humans themselves, to the Moon and beyond.

Again, Hawaii Senator Matsunaga pointed the way. Speaking to the Governor's Symposium on Space via video in 1988, he suggested that the state take adantage of "considerable opportunities for discreet, low-cost launching activities involving scientific and commercial payloads, mainly aboard sounding rockets into the upper atmosphere or stratosphere.

The state chose a different strategy, but Matsunaga was well briefed.

Kiril Borissov Serefimov, President of the Bulgarian Astronautical Society, has participated in space science investigations since Sputnik and has published literally thousands of papers, many of them on the subject of upper atmosphere dynamics. According to Serefimov, Hawaii's distance from large continental land masses makes it ideal for studying certain levels of the middle atmosphere.

While human generated products skew the data on atmospheric monitoring in many locations around the globe, he writes, "[Hawaii] can be considered a basic [area] with minimal anthropogenic effects on the middle and upper atmosphere where solar-terrestrial influences could be studied in their purity. This would make it possible to determine the *dynamics* of the studied media, ie, the wind systems, the circulation, diffusion, electromagnetic drift, and all the types of transport of neutral particles and plasma in the near-Earth environment. In this respect, the Aloha area [sic] is fundamental for comparisons with continental rocket and other measurements."



The Weaver Girl sounding rocket, launched from Hainan, China, is transportable on a small trailer. The rocket and carriers could easily be modified for use aboard an ocean-going platform. Weaver Girl payloads collect scientific data for weather monitoring and other humanitarian uses. Located at 19-21°N, Hainan shares many climatic characteristics with Hawaii (Photo SPC).

Acknowledging that Hawaii is "very convenient" for reaching orbit, Serafimov adds, "The psychological attitude of the Hawaiian society toward the construction of such equipment is, however, very important and creates social conditions for the future development of the Aloha Spaceport."

Space Education

Sounding rocket programs are emerging as a viable means of giving students hands-on experience in engineering and scientific research. In Spetember 1992, a group of 50 students from 6 Colorado universities joined NASA and students from Virginia to launch an Orion suborbital rocket from the NASA Wallops Flight Facility. In Florida, a joint venture of the U.S. DoT Office of Commercial Programs, the Aerospace States Association, and the legislatively mandated Spaceport Florida Authority recently sponsored the 'Rockets for Students' program for elementary and high school level students from across the USA. The week-long program culminated in their participation in the launch and tracking of a NASA meteorological rocket from Cape Canveral AFS, Florida. Activities similiar to these have interstate and international implications for a Hawaii Pacific Aloha Spaceport.

> *Thus, space education becomes an element of motivation and initiation in the education of adults. . . .*
> —*Kiril B Serefimov, Bulgarian Astronautical Society*

GTE Hawaiian Telephone Co. recently sponsored a $12,000 grant for two island teachers to teach model rocketry and to hold a rocket festival in May 1994. Alain Morin and Lynol Oda of Waimea School received money for training; school improvements, including computer materials and a wind tunnel for testing rockets; and the festival. The teachers told the *Honolulu Advertiser* in June 1993 that, "The intent of this project is to teach students and the community about rockets by building, testing, flying, and analyzing these flights."

As Serafimov notes, "Hawaii could become an excellent base not only for local space education but also for an international space education center." He goes on to suggest "vanguard use of satellite educational methods," including teleconferencing. Education in space sciences increases interest in science, technology, mathematics, and culture. "Thus, space education becomes an element of motivation and initiation in the education of adults. . . ."

Humans and Economics

Based soundly on the premise of peaceful exploration, the Pacific Aloha Spaceport could create a unique center for commerce and industry. Lee Iacocca was speaking of Spacehab, but his words could apply to the Pacific Aloha Spaceport: ". . . Innovative and entrepreneurial strategy will help the U.S. retain its global leadership in space, science, and technology."

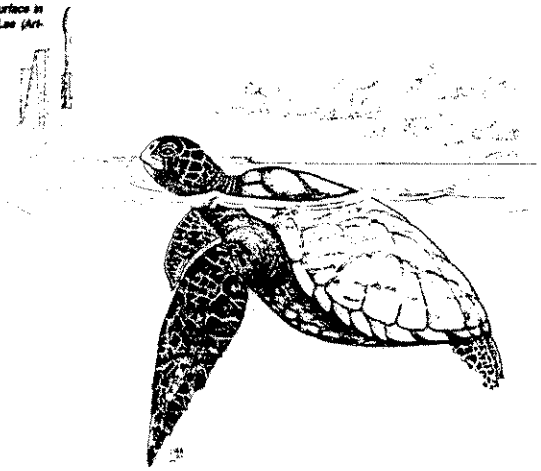
A new generation of boosters (See 'Advanced Propulsion') could lift humanity to new heights from the Central Pacific.

Embarkation: Offshore Ka Lae

To live up to the nature of space enterprise, which ideally should be as much uplifting excursion as economic adventure, the entire Pacific Aloha Spaceport program should base itself on a principle of inclusion. When dealing with land in Hawaii, a great deal of attention must be paid to cultural and historical considerations, even down to details concerning the traditions of certain families in specific districts.

Failure in this area would eliminate the possibility of local *aloha* for the effort, would destroy the premise of a truly pacific venture, and would add one more betrayal onto a long line of broken promises made to Polynesians and their descendants.

An Orbital Rocket lifts off from an ocean-based platform. Keeping the infrastructure minimal and the technology environmentally friendly reduces impact on marine life. Cryogenic engines release a cloud of steam and send ripples across the water's surface in this artist's conception of a launch off Ka Lae (Artwork Henry Lyon / Leilehua Yuen).



Russian Epidemiological Analysis

Two members of the Russian Institute for Biomedical Problems, Vjatcheslav K Ilyin, PhD, and Jury N Kuprin, PhD, point out that establishment of an international scientific center and launch site will raise sanitary and health questions that will have to be addressed.

"The creation of the port will require the participation of large numbers of specialists and workers from all over the world and concentration of all of them on a comparatively small piece of Earth [or at sea]. Each of the humans, having been translocated from one geographical region to another, is faced with serious changes of his organism's microbial content . . . ."

In addition, when spaceflight is involved, the interaction of crew members' "microbial statement" with each other and within the closed life support system of a spacecraft increases the risk for infectious disease, they write. Some microorganisms establish "anthropotechnological niches" in life support elements or on the interior of the spacecraft.

Furthermore, in an offshore environment, divers will face similar risks of infection from various strains which live in the water or in the water supply of a diving or support vessel, or in diving equipment.

Ilyin and Kuprin recommend that "the realization of the project [with regards to] microbial and antiepidemic security of spaceport construction and functioning would require the organizing of a special laboratory" such as exists at the Baikonur Cosmodrome, which was built under their supervision.

A thorough evaluation of sanitary-epidemiological statement in the locale would provide effective measures on all the stages of epidemic process against the development of possible infectious diseases, they conclude.

Investigation into meeting these challenges could well have spinoff benefits for residents of the islands, who face millions of tourists each year, each of which is "translocated from one geographical region to another."

Moving the launch facility offshore in a single stroke addresses two major issues: real benefits to Hawaiians; and land use.

Benefits to Hawaiians

According to anthropologist Ben Finney, "Developments brought by [non-Hawaiians] have been disaster for Hawaiians . . . . The historical record is pretty grusome." The resulting air of mistrust has grown thicker as Hawaiians tally the score during a burgeoning cultural renaissance. They are unlikely to quietly allow yet another exploitive venture on what is regarded as sacred land.

In order to be accepted by local communities, the launch venture must offer real and definite benefits that are obvious to the people living there. An offshore facility provides these in a way no other spaceport proposal does. Launching at sea will require tugboats and various other seafaring support, an industry with traditionally heavy Polynesian participation. The work provided would bring in a much higher pay scale than the menial jobs Hawaiians often end up with through development ventures.

Marine biologist Greg Brown raised the possibility that an offshore facility could have an unexpected benefit for local fishermen. While the overall impact of an ocean platform is undetermined, it would probably act as a Fish Aggregation Device. Brown said that there are two main schools of thought on the effect of FADs on fish populations.

One school holds that natural feeding grounds and existing bucys would be negatively impacted, as the new device would draw fish away from their former haunts. Fishermen would then be negatively impacted. While the platform would be collecting fish, they would then be in a less desirable fishing area, due to the rougher waters off Ka Lae, compared to fishing grounds in the lee of the island.

The other school of thought is that the natural feeding grounds

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and existing buoys would be unaffected and that the increase in habitat would increase the number of fish moving into the area. While the additional fish would be in a less desirable fishing area, the total fish population off the Kona coast would have increased, relieving at least some of the pressure of overfishing.

Brown said he favors the second scenario, but that not enough data have been collected to speak with any certainty.

Land Use

The potentially explosive issue of land use, which the current state effort will most likely spend enormous amounts of money dealing with, virtually disappears with the offshore move. A case very definitely could be made that the estimated additional costs associated with sea-based launches would be paid back many times by the relative absence of public outcry, court litigation, and public relations expenses. In addition, much of those "additional" costs would be invested in local enterprises supporting at-sea operations.

In order to be accepted by local communities, the launch venture must offer real and definite benefits that are obvious to the people living there.

An excellent example of the challenge facing a land-based facility can be found in an excerpt from a letter written by an elected Ka'u representative. County Councilwoman Keiko Bonk-Abramson writes, "A spaceport in Ka'u would permanently and negatively impact our environment, eliminating any possibility of utilizing existing resources for the benefit of our community.

"It will have an irreversible negative impact on the mission and work of the neighboring Hawaii Volcanoes National Park. It will adversely impact many existing businesses such as fishing, agriculture, dairy, astronomy and tourism, all of which depend on the relatively pristine and rural environment in Ka u. According to testimony given to the County Council by the Hawaii Visitor's Bureau's Big Island representative, tourists come to this island for our natural beauty and open space. If they wanted to see huge industrial complexes they would stay home."

While Bonk-Abramson's assertions are mostly undocumented, they reflect very accurately the 'conventional wisdom' of the residents of Ka'u, who may not have the resources to fund comprehensive studies but are smart enough to know when they are being strung along.

Technology and Operations

The technology to support launches from an ocean platform is well established. A 1989 study by the engineering firm Brown and Root of Houston TX estimated that a semisubmersible vessel capable of supporting launches far more complicated than those envisioned for the Pacific Aloha Spaceport could be obtained in 24 months for $46 million. Supporting equipment at quayside slips and docks could be developed for $30-$45 million; and propellant facilities and transportation for $92-105 million.

According to the study, "A mobile platform offers the possibility of assembling a space vehicle onshore and transporting it to a sea based launch site. Problems associated with population safety, site acquisition, noise levels, and interference with ongoing activities are mitigated offshore. *Also, present industry unit costs of offshore platform fabrications and shipbuilding are much lower than unit costs of existing land based launch facilities* [emphasis added].

The water off Ka Lae's coast gets deep very rapidly, making use of a fixed platform or a mobile jack up platform problematical. However, semisubmersible vessels are available that can "[operate] in water depths up to 4,500 feet and [are] able to survive in over 100 foot waves and 100 knot winds," the Brown and Root engineers say. These platforms have long track records supporting remote oil and gas development.

Economically, "Costs for floating or fixed platforms used in the off-shore oil industry are probably less than one half the cost of providing new, fixed, onshore launch facilities," according to the study.

The launch vehicle is assembled and payload integrated at an onshore facility. Upon completion it is transported to the platform offshore. (Depending on specifications, the platform itself may be used for transportation.) Propellants, manufactured locally, are shipped from an onshore facility to the platform and loaded into the launch vehicle. After the launch the support infrastructure (or the entire platform) is returned to the on shore site for refurbishment.

Launching from offshore provides the maximum number of trajectories, reduces noise pollution and danger to human life and property, and leaves the land, at a premium in Hawaii, available for humans, rather than machines.

Future Flight Hawaii students display their 'To the Moon' ensign. Future Flight is a prime example of a pacific space endeavor, teaching youngsters the benefits of science in a fun, challenging, thought provoking way (Photo William Ing, Hawaii Tribune Herald).

Technology: Advanced Propulsion

Air quality and environmental impact comprise some of the most important issues surrounding an industrial facility in an island environment. Anthropologist Ben Finney, who has studied Polynesian cultures in Tahiti and Hawaii for many years, advises that environmental soundness will be one of the primary criteria Hawaii residents will use to judge the acceptibility of a rocket launching facility.

One space consultant, referring to the early 1993 outlook for the Hawaii state government effort, said, "You're in a difficult situation there that's hard to get out of," due to the political climate ensuing from environmentalist resistance to the facility.

The resistance is not necessarily ill-placed. Commercial enterprises have one overriding purpose — to make money. Lockheed, so far the only company to show any public interest in the Hawaii venture — probably because of its role in the Iridium program — is now marketing a new launch vehicle built using the same solid rocket technology that most military rockets rely upon.

Solids are easy to store and transport and generally cheaper to construct and prepare for launch, according to some space experts. However, Robert M. Bowman, head of the research program under President Carter which later became Ronald Reagan's Star Wars effort, believes the savings are illusory. He comments that solid rocket technology and support infrastructure is well-developed through years of military research. Therefore, "solids seem less costly to develop."

Cryogenic Propulsion: The Space Shuttle Main Engine uses liquid oxygen (LOX) and liquid hydrogen fuel, producing clean, powerful combustion. Condensation clouds drift off the fuel lines above the bell, while from it, a virtually clear flame shoots down. The Atlas 2 rocket (inset left) uses a highly refined kerosene and LOX while American Rocket Company's Demonstration Motor 1 (inset right) is testing a low-impact solid called hydroxyl terminated polybutadine (Photos Rockwell / Space Commerce Corp / Amroc).

On the other hand, solid rocket motors are very dirty, churning out large amounts of hydrogen chloride (HCl) and Aluminum Oxide (Al_2O_3). HCl combines with water to produce hydrochloric acid, a danger in itself which, when added to the chemically inert Al_2O_3 yields a corrosive crust which is difficult to clean up. The environmental impact of solids is now so well established that every bid to develop the Air Force's New Launch System relied exclusively on liquid fuel designs, commonly refered to as 'cryogenics'.

According to Bowman, cryogenic operations "cost substantially less" than those surrounding solid rocket motors. In addition, cryogenics would "eliminate 95 percent of the ozone layer damage that would be caused by a rocket launch" using solids. "There is no excuse whatever for designing rockets using materials that will release toxics into the atmosphere, such as aluminum, hydrochloric acid, and chlorine, which affects the ozone layer," Bowman contends.

In terms of combustion, liquid hydrogen and liquid oxygen are considered just about the purest fuels available. The exhaust is largely free of anything but hot steam.

However, as veteran space propulsion expert Max Hunter wryly comments, "Nobody pays any attention to the possible environmental impact of the steam." In addition, Hunter adds, if one is

Hydrogen Economy

Dr William Gaubatz, Program Director for the Single-Stage-To-Orbit (SSTO) Rocket Technology project at McDonnell Douglas, wants to see his company's 'Delta Clipper' become the first orbital transport vehicle with airline-style reusability.

It is designed to use liquid hydrogen and liquid oxygen for the main propulsion system and hydrogen / oxygen related compounds for the reaction control system used for maneuvering the vehicle.

According to Gaubatz, the Clipper could have a significant impact on the availability of hydrogen as a fuel. "You can look at anything that hasn't been used much and say that it's too expensive," Gaubatz claims. "The same was said about jet fuel years ago, and now we have the infrastructure that supplies jet fuel in a safe and reliable way, at a reasonable cost."

What will create the infrastructure is demand, and the Delta Clipper could create a big market for hydrogen if it lives up to the dreams of its designers. Gaubatz envisions fleets of Delta Clippers lifting off from airports anywhere in the world, freed from the constraints of geography by having no stages to throw away.

The impact of this development would not be felt until well into the first decade of the 21st century. The main challenge is in developing the infrastructure for delivering the hydrogen to its point of usage. Gaubatz notes that "large spills [of liquid hydrogen] dissipate rapidly" and create no lasting environmental damage beyond that of severe temperature trauma.

The availability of hydrogen for propulsion will reduce its cost enough to make it feasible for numerous other applications, Gaubatz claims. "When the need is there, the propellant will be there," he concludes.

Interest in hydrogen is growing in Hawaii due to its abundance of sea water and ample solar energy, which could be harnessed to desalinate and transform the water, via electrolysis, into its hydrogen and oxygen components. Stephen R Boydston of Topeka, Kansas, points out the important environmental issues of land area required for solar cells and the disposal of impurities from the desalination process. However, the presence of these two resources could enable Hawaii to pioneer in the development of a 'hydrogen economy'.

considering overall environmental impact, the question of hydrogen production needs to be addressed. "How are you producing the liquid hydrogen?" he asks. "By burning hydrocarbons?"

According to Hunter, a hydrocarbon / oxygen combination, such as the kerosene / oxygen combination used in the General Dynamics Atlas first stage booster, "is not that dirty. It puts out water and carbon dioxide. Actually, it puts out carbon monoxide as well, but most of that converts to carbon dioxide during the afterburn. The amount of carbon dioxide emitted is miniscule in comparison to the levels of carbon dioxide in the atmosphere — something on the order of 10^{-12}."

"The case can be made," Hunter concludes, "that hydrocarbon / oxygen rockets are environmentally good enough."

General Dynamics, which has probably spent more money on developing cryogenic propulsion systems than any other major rocket launching company, is examining the possibility of producing an environmentally friendly booster to fit the lightsat niche. Lightsats are small satellites designed to fulfill one specific, possibly short-term, mission at a fraction of the cost of heavier, more payload intensive platforms.

Ed Ward, Director of International Marketing for General Dynamics, said he is convinced the market for lightsats is much greater than expected but, to be competitive, launches would "need to come off the equator."

Producing a small rocket using cryogenic propulsion poses specific and challenging engineering problems. Jim Bennett, a California space consultant and former President of American Rocket Co., notes that launchers use hydrocarbons instead of hydrogen because hydrogen is bulky. "The cost per pound of propellant is not an issue; the issue is cost per pound of rocket," he says, pointing out that the increased structure to hold the bulkier fuel adds up to a heavier rocket.

On the other hand, Bennett adds, "people have the assumption that a manned system must be large," which is not so. The Gemini crews were launched on Titan 2 boosters, he notes. A cryogenic microsat launcher is probably just a matter of time.

The developing field of hybrid launch technology — half solid, half liquid propulsion — offers a further alternative. Hybrids use liquid oxygen to burn a synthetic rubber compound, hydroxyl terminated polybutadine (HTPB), which has an environmental impact similar to the Atlas booster described above.

"There is no excuse whatever for designing rockets using materials that will release toxics into the atmosphere, such as aluminum, hydrochloric acid, and chlorine, which affects the ozone layer."
— Robert M Bowman

Amroc asserts that hybrids ". . .can not explode. . .can be developed quickly at low cost. . .are environmentally benign. . .[and] have greater economies of scale than either solid or liquid motors."

Development of low-impact fuels and technologies for a Pacific Aloha Spaceport is of high priority. One early respondant to the study has offered assistance in this area, and others are likely to come forward. T.R. Gopalakrishnan Nair, MTech, PhD, and International Space University participant working at the Liquid Propulsion Centre at Trivandrum, India, cites experience in technology related to the design, development, and launch of space vehicles in a request to participate in further work on the Pacific Aloha Spaceport.

Conclusions

To realize a Pacific Aloha Spaceport, the enterprise must be global, local, and 21st Century in spirit and technology.

Space being the common heritage of all life forms, space exploration may be most appropriate in the context of Aloha, cooperation, and a willingness to use all knowledge gained for the common good of all.

Major characteristics for a successful venture include: 1) that its nature be 'truly pacific'; 2) that it be a launch pad first for space, then to the Moon and other worlds; 3) that it involve exclusively humanitarian / commercial payloads; 4) that it be located offshore Ka Lae; and 5) that it employ advanced propulsion systems proven clean and safe for the environment.

Before making any move to establish a spaceport in the area of Hawaii Island, first space / science education and awareness activities should be organized throughout the state.

If there is to be any launch site — human or otherwise — in Hawaii, it should initially be focused on, and throughout its lifetime continue to support, educational goals.

A Hawaii spaceport could include an attached educational facility that to train the youth of Hawaii in astronomy, navigation, and all sciences related to the stars and the Moon. Providing the infrastructure to enable Hawaiians to relearn ancient skills using the most modern technology would help a formerly disentranchised people to regain pride and to develop a technology-based economy for the modern world that is related to their own history, creating a place for them to become leaders in the Space Age.

A high technology endeavor, such as an environmentally low-impact spaceport focused on humanitarian activities, could aid in returning Hawaiians to a position of prominence in science and exploration.

Any facility, wherever it is located, should be built only after technology to mitigate any negative impacts is identified and incorporated into the final design. The facility must be kept open and available for inspection by all interested parties from the state, the nation, and the world. No military or aggressive business should be allowed.

The existence of an active launch facility — onshore or offshore — would stimulate interest that would foster growth of educational programs, eventually providing local talent for technical, engineering, and administrative positions. One valuable, and readily available, resource is Affiliate Campus status with the International Space University.

Whatever activities are conducted in Hawaii regarding space exploration, they should be for the purposes of benefitting 1) the people of Hawaii, 2) the USA, and 3) international cooperation and interests.

Pacific Aloha Spaceport provides the means to integrate Aloha culture with the high technology / exploration leap into the cosmos. The inclusion of alternative, potentially conflicting, viewpoints creates a new order of initiative geared toward the 21st Century rather than a repetition of exploitive scenarios.

Hawaii can become the most popular place on Earth for people both to HoneyMoon, and to go to the Moon.

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Pacific Aloha Spaceport Feasibility Study

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The publisher wishes to remember the caring and daring of his late father Royal, who honeymooned with his wife Shirley in Hawaii in 1940. His universally acknowledged gentleness and empathy toward all — traits shared by his son Peter and daughter Leslie — carried forward the true spirit of Aloha.

Inspiration and support for this study also owe much to the faith and persistence of Joann my wife, daughter Sidra and son Arian, who voyaged to Hawaii over great distances.

Finally, the full cooperation and commitment of Space Age editorial associates Bill Fennie, Leilehua Yuen and Brian McMahon have proven indispensable throughout this enterprise.

Mahalo ! Ad Astra — SD

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Imua I Na Hoku
. . .Forward to the Stars

Back Cover: A star map of the sky above Hawaii in June, from the book *North Star to Southern Cross* by Will Kyselka, University of Hawaii Press

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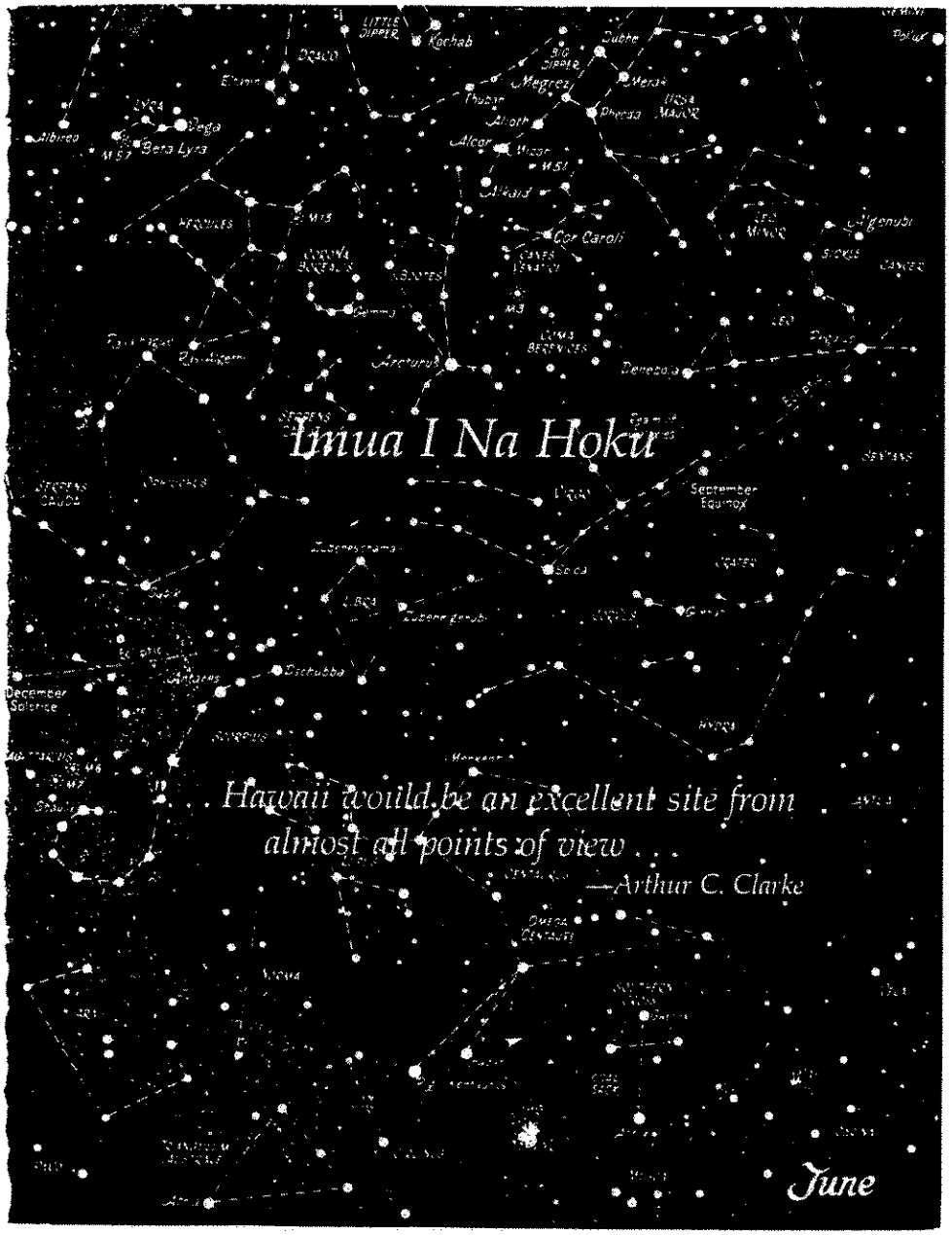

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SEP. 30 1994

Mr. Steve Durst, Ms. Leilehua Yuen,
and Mr. Bill Fennie
Hawaii Island Space Exploration Office
75-5751 Kuakini Hwy.
Kailua-Kona, HI 96745

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Durst, Ms. Yuen, and Mr. Fennie:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

This responds to dEIS-related comments contained in the Pacific Aloha Spaceport Feasibility Study, and was prepared with the assistance of Decision Analysts Hawaii, Inc.

Comment: *I have never heard a persuasive argument that there is sufficient market for launch services to warrant the tremendous investment required to prepare a launch facility.*

Response: The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the number of available launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: *The spaceport is a rathole that could swallow up billions of dollars in state funds and attempts to move the project forward.*

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. Moreover, if space projects continue to receive the same funding every year, at the current rate it would take approximately 2,000 years before the annual appropriation for space projects would accumulate to $1 billion. More realistic projections of state contributions, if a project were to be developed, are discussed in Appendix IXA of the dEIS. The annual amounts at full development of $3.7 million to the County and $4 million to the State are not the total tax revenues that would be available to cover school, infrastructure, social and pubic-health services. Rather, these amounts are the net tax revenues that would remain after the County and State fund supporting infrastructure and services.

Comment: *There is serious question about the integrity of the EIS, since the original group contracted to prepare the EIS was fired.*

Response: For your information, the previous consultant was not fired, the contract was reassigned. We find it difficult to respond to a general statement that the dEIS lacks integrity. The document meets all of the Chapter 343, Hawaii Revised Statutes content requirements, and although the document was never intended to substitute for an Environmental Impact Statement under NEPA, all of the NEPA content requirements (as of 1991 when the EIS was contracted) were incorporated into the document. Project specific requirements will be addressed in a supplemental document--to be funded by the prospective developer--when a project is known.

"Unresolved Issues" is a content requirement of the state EIS Rules. In an initiative of this scope, the process of analysis and review should be as deliberate as possible. As a programmatic document with limited budget (compared to most EIS of similar scope), the dEIS analysis identified several areas that need further study before an informed "go/no-go" decision can be made. It was a policy decision of the State to defer further studies until an actual project is imminent so that these studies could be funded by the prospective developer and not the State. The unresolved issues will be addressed in future environmental assessments and statements.

All of the data used to support the findings of the dEIS are included in the various technical appendices. The data and assumptions are provided so that reviewers would be able to perform identical calculations and arrive at the same results. To the best of our knowledge all of the data provided is accurate.

The Health Risk Assessment conducted for this project (Appendix VIIIA) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Comment: *The State proposed that the launch facility be exempt from many of the rules and guidelines that apply to all other residents and companies in Hawaii. Due process may be denied to those people whose lives or businesses were disrupted by the activities of the launch facility.*

Response: The developed or improved portion of the launch facility would cover about 1,000 acres - much of which is already owned by the State of Hawaii. The remaining land needed for the developed or improved portion of the launch facility would be purchased at its fair-market value.

The undeveloped or unimproved lands within the Population Control Zone would cover more than 9,000 acres. These undeveloped or unimproved lands that are privately owned

would remain in private ownership and available for agricultural use. Landowners would be compensated for any decrease in the value of their land due to reduced development potential (Appendix IXA, pages 7-12 and Appendix IXE, pages 5-7). Furthermore, any covenants, conditions or restrictions on landowners would require mutual written agreement between the State and the landowner.

The impact on land values - both within and outside of the Population Control Zone (PCZ) boundary - is discussed in Appendix IXA (pages 7-12) of the dEIS. As indicated in the referenced Appendix, if a decrease in land value caused by the spaceport occurs, landowners could be paid for the loss of value.

Proposed precautionary measures to protect environmental values, and human benefits therefrom, would be mandatory conditions of any permits issued for the project. Chapter 10 of Volume II discusses the policies, permits, and approvals that apply to the spaceport project. Starting on page 10-6 is a list of applicable reviews, permits, and/or approvals that would be required.

It has been proposed that the Authority would be exempt from taxation, as is the case with all State authorities and agencies; it makes little sense for the State to tax itself. But private companies - the Consortium, the launch companies, various users of spaceport, businesses that supply goods and services to spaceport, etc. - would be subject to the normal State and County taxes.

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Comment: *There is serious concern that the real purpose of the launch facility would be to serve the needs of the military.*

Response: The launch facility is intended solely for commercial use. Hawaii State Law (Act 172, 1990) prohibits the launching of weapons of destruction from a Ka`u commercial launch facility. Although it is possible the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government does not, in fact, have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: *The sentiment among people who live on this island has been generally negative. Serious questions have been raised about safety issues and disruption of the existing community and life-style.*

Response: As stated in Volume II, Chapter Seven and in Appendix IXC, a resident survey indicated a strong preference for continuing their existing lifestyles. The qualities of Ka`u that respondents felt should be preserved included its life-style, open space and shoreline, historic and archaeological sites, and fishing and gathering

grounds. These qualities must be carefully considered during all stages of the project, if developed. Although a spaceport would predispose Ka`u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the PCZ, the project area would be mostly open space.

Comment: *The spaceport should be located on an offshore launch platform off KaLae.*

Response: Volume II, Chapter Nine of the dEIS discusses the alternatives that were considered. As noted on pages 9-12, 13, the floating launch platform option was examined by researchers at the University of Hawaii. Although a Ka`u base was investigated, taking into account technical complexity, risk areas, pros and cons, and time and cost to develop the platform, the recommended option involved facilities near Hilo harbor.

We agree that the floating platform option alternative offers unique advantages, however, current estimates indicate that a land-based option is less costly in terms of construction and maintenance. It is possible that this alternative may become viable in the future.

Comment: *The Spaceport could include an attached educational facility to train youth in astronomy, navigation, and all sciences related to the stars and the Moon, etc.*

Response: It would indeed be worthwhile to have an educational facility to train Hawaii's youth in all sciences related to the heavens. In terms of logistics, however, it would be more practical if this facility were more centrally located than Ka`u so that the greatest possible number of the Big Island's young people would be able to benefit from it. Perhaps an initiative such as this could be coordinated with the astronomy operations at their base support facilities in Hilo or in Waimea, and with UH Hilo where some related courses are already offered.

IASCO

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November 16, 1993

The Honorable John Waihee
Governor of Hawaii
c/o Office of Environmental Quality Control
200 South King Street, Suite 400
Honolulu, Hawaii 96813

Re: Proposed Commercial Satellite Launch Facility for the Big Island of Hawaii

Dear Governor Waihee:

I am writing to you on behalf of IASCO regarding the proposed commercial satellite launch facility that is planned for Palima Point on the Big Island of Hawaii. IASCO has been a land owner in Hawaii since the early 1970s, and all of the Hawaii property that we currently own is adjacent to the proposed Palima Point commercial launch site. Approximately 1,100 acres of IASCO's over 4,000 acres of property is devoted to macadamia nut production.

After careful study of the Environmental Impact Statement ("EIS") and discussions with our local consultants in Hawaii, our company is opposed to the development of a commercial satellite launch facility at Palima Point.

There are numerous reasons for IASCO's opposition. Both the transportation and storage of rocket propellants and other hazardous materials are a major potential environmental threat. The manner of transportation of these materials proposed by the EIS poses a serious risk of spills in remote areas where emergency services are not readily available. Safety plans, no matter how thoroughly implemented, cannot eliminate all risk factors, such as vehicular accidents, which could cause inadvertent ignition of propellants or spills. The inherent risk of transporting propellants from Hilo to the launch site is far too great.

In addition, the storage of rocket propellants and other hazardous materials in this agricultural community would be vulnerable to earthquake, fires, explosions and spills due to human error. In the event of an accident that releases toxic gases or chemicals into the air or soil, the effects on human life, wildlife and plant life in the Palima Point area would be devastating. If the groundwater is contaminated by a spill, local drinking water would become unfit for human consumption as well as for agricultural use. IASCO is dependent upon the local groundwater supply to irrigate its macadamia nut trees. A worst-case spill would have a catastrophic effect on the entire local ecosystem, including our macadamia nut orchard.

Even normal rocket launches pose an environmental threat. Toxic emissions, such as HCL, which occur during normal launches, have been found to be extremely detrimental to agriculture. Other measurable levels of pollutants, such as unburned fuel, could also have an adverse affect on our macadamia nut trees.

It is IASCO's opinion that Palima Point is not an appropriate location for the proposed launch facility. If you seek development in this area, IASCO favors alternative development projects, such as resort and/or residential development. Such development would not subject the local environment to potential hazardous materials accidents on a daily basis and is much more compatible with current land usage. While the State's efforts to improve the area are laudable, the EIS does not justify construction of the launch facility in light of the many potential risks. More comprehensive research and analysis of the project's impact on and compatibility with agriculture in the surrounding area should also be conducted before any final decision is made.

Finally, the proposed launch site industrial area encroaches IASCO property. IASCO has no interest in selling or leasing its land for such industrial purposes at this time. IASCO would oppose eminent domain proceedings, which would likely involve a long and costly process for the State of Hawaii and IASCO. The proposed launch facility severely diminishes the value of IASCO land within the Population Control Zone as a result of restricted access, CC&Rs that would presumably restrict future land use and the general nuisance impact of the project. The State would be required to compensate IASCO for this significant reduction in value and for any easements that it might require.

For all of the reasons described herein, IASCO strongly opposes the development of a commercial satellite launch facility at Palima Point. We believe that more in-depth research on the impact of the facility on macadamia nut trees and other agricultural crops in the surrounding area must be conducted before an informed, environmentally-conscious decision can be made on the project. The people and the environment of Hawaii deserve nothing less.

Very truly yours,

Edwin K. Walters
Senior Vice President

cc: Mr. Takeshi Yoshihara
Deputy Director
Department of Business,
Economic Development & Tourism

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DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

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IASCO
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Foster City, CA 94404

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Walters:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services, Risk Science Associates, and Decision Analysts Hawaii, Inc. contributed to the preparation of the following responses.

Comment: *The risk to the area from an accident is unacceptable. The groundwater supply could become contaminated by a spill and local drinking water would become unfit for human consumption as well as for agricultural use.*

Response: The analysis of on-site spills in the dEIS represents a conservative overestimation and does not account for mitigating measures. The worst case scenario involves an instantaneous release of an entire Delta II tank load of hypergolic propellant (615 gallons of hydrazine/UDMH and 712 gallons of nitrogen tetroxide). The analyses do not assume any containment, barrier or other obstacle to the downward migration of the spilled materials from entering the ground. Federal regulations require containment areas around the launch pad and fuel storage area to prevent spilled materials from entering the ground. Further, contamination of existing drinking water wells will not occur under these spill scenarios because the wells are located upgradient from the launch pads. An analysis of the potential effects of groundwater contamination due to an on-site spill at the proposed Palima Point site, by Risk Science Associates (RSA), is attached (Attachment A).

The events most likely to result in potential groundwater contamination are transportation spills, either on or off-site. The amount of spilled material would probably be much less than what is assessed in the dEIS analyses because the containers are designed and tested to withstand impacts and the shipments would be accompanied by a HAZMAT team. The RSA analysis (Attachment A) also addresses potential groundwater contamination from spills during transportation of toxic substances to the Spaceport. They conclude that *"Due to the quick clean-up and removal by the HAZMAT team accompanying the transportation truck, minimal impacts will occur to soil and groundwater due to spilled material."*

Comment: *The risk to the area from even normal launches is unacceptable because of potential effect of toxic emissions on agriculture.*

Response: It is unlikely that macadamia trees located near Palima Point will be adversely affected by the release of HCL during normal rocket launches at the proposed spaceport. An analysis of the potential adverse affects of HCL on macadamia nut orchards near Palima Point, by Risk Science Associates, is attached (Attachment B).

Comment: *Palima Point is not an appropriate location for the proposed spaceport. There are better uses for the land that are more compatible with agriculture.*

Response: Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory

agencies, the legislature, and--through their elected representatives--members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments. As noted in the cover letter, the State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project.

Comment: *The proposed launch site industrial area encroaches [on] IASCO property and IASCO has no interest in selling or leasing its land for these industrial purposes at this time. The proposed launch facility severely diminishes the value of IASCO land within the PCZ.*

Response: The impact on land values - both within and outside of the Population Control Zone (PCZ) boundary - is discussed in Appendix IXA, Chapter 7, of the dEIS. As indicated in the referenced chapter, if a decrease in land value caused by spaceport occurs, landowners could be paid for the loss of value. Such payment is allowed for in Hawaii Revised Statutes §§171-30 (1985), and is addressed in Appendix IXE of the dEIS.

"Less-than-fee" agreements would be preferred for most land within the PCZ, especially those areas that only serve as buffer zones. Should the State be unable to reach agreements with landowners, it is anticipated that any purchase of land would occur through proper legal procedures at its fair-market value as determined by appraisals and through negotiations (DEIS, Appendix IXE).

Attachments

Attachment A

POTENTIAL ADVERSE EFFECTS OF FUEL SPILLS ON GROUNDWATER RESOURCES ALONG THE TRANSPORTATION ROUTE AND AT PALIMA POINT

By

Risk Science Associates
August, 1994

12-241

Mr. Edwin Walters
IASCO
Attachment A

ON-SITE SPILLS

Background and Overview. The potential for contamination of IASCO's irrigation water is related to the location of the wells being used. Groundwater from the known upgradient municipal wells would not be affected by any potential contamination caused by a fuel spill at the launch pad. Wells located downgradient from a spill site could, however, be affected. The exact location of these wells would have to be identified in order to evaluate the potential for groundwater contamination and subsequent health, ecological, and agricultural effects.

Because there is a potential for groundwater contamination during a spill in which rocket fuel is released to the ground without secondary containment, mitigation measures (including containment systems) will be implemented in order to prevent soil contamination from spill events at the propellant storage, payload processing and launch areas of the proposed facility. As stated in the DEIS (Volume I, page 5-35):

> *"State and Federal regulations require that propellant storage areas incorporate proper containment. Design of the propellant storage, payload processing and launch areas must include containment. Liquid fuel storage tanks will be surrounded by dikes, barricades, berms or other suitable protective mounds. Reservoirs will have a capacity 10 percent greater than the propellant storage tanks. These measures will limit the surface area of a spill and prevent the contents of tanks from mixing with incompatible material that could result in fire, explosion or toxic conditions. The containment areas will have impervious linings to protect groundwater from contamination."*

According to the groundwater resources investigation prepared by Harding Lawson Associates (DEIS Volume III, Appendix B), the largest accumulated amounts of liquid fuels in single vessels without secondary containment will be at the launch pads. The fuel spill scenarios evaluated in the HLA investigation are assumed to occur at the central launch pad which is about 1,500 feet inland from the ocean shore.

In the HLA investigation, two types of fuels are assumed to spill in a sudden accident from fully fueled rockets and infiltrate the subsurface in a limited area near the launch pad: 615 gallons of Aerozine-50, a liquid fuel used in Delta rockets that is a mixture of hydrazine and UDMH and miscible with water, and 15,676 gallons of kerosene (RP-1), a liquid fuel used in Atlas rockets that is immiscible with water. On page 16 of the groundwater resources investigation, HLA states:

> *"Conceptually, fuels released over the ground surface are expected to infiltrate, percolate downward through the unsaturated zone to the groundwater surface, and then migrate horizontally with the groundwater either as a solute (in the case of miscible liquids) or a floating separate-phase liquid. Groundwater in the area of the proposed spaceport generally flows seaward and discharges from the subsurface at the shore of the ocean as dispersed fresh or brackish springs."*

The well inventory attached to the HLA report (DEIS Volume III, Appendix B, Table 1) shows that existing drinking water wells are located inland from the proposed facility - near the town of Pahala and along the highway to the south of the site (see also the groundwater hydrology map in Plate 3 of the HLA report). The launch pads and other Spaceport facilities are downgradient from these wells, therefore, they would not be affected by spills at the launch site.

Because of the remote possibility that some groundwater sources might be downgradient of a spill, dosages, cancer risks, and noncancer hazard indices for ingestion of contaminated groundwater are quantified. These analyses are conservative overestimates, however, because the mitigating effect of the concrete launch pad is not included. In other words, the analysis does not assume any containment, barrier, or other obstacle to the downward migration of the spilled material.

Spills Involving Aerozine-50. The results of the groundwater modeling studies conducted by HLA (DEIS Volume III, Appendix B, page 19) indicate that, in the case of a spill of 615 gallons of Aerozine-50 at the launch pad,

> *"Aerozine-50 would percolate vertically from the spill site and reach groundwater about five days after the spill. The daily amount of fuel reaching the groundwater increases until about 20 days and then decreases asymptotically. In the groundwater, Aerozine-50 would dissolve in groundwater and migrate toward the shore. The affected groundwater zone would spread laterally toward the shore and discharge into the ocean in a zone approximately 2,000 feet wide. The maximum peak concentration would be approximately 11 milligrams per liter (mg/l) at the shore near the center of the zone and would decrease in both directions along the coast. Aerozine-50 would reach the shore approximately 20 days after the spill occurred and continue discharging with the groundwater for about a year."*

This is a conservative overestimation because the mitigating effect of the concrete launch pad is not considered.

In the following analysis, it is assumed that 50% of Aerozine-50 is hydrazine and 50% is UDMH. Dose, risk, and hazard index due to ingestion of groundwater contaminated with Aerozine-50 is quantitatively evaluated below.

$$\text{Intake} = \frac{C_w \times IR \times EF \times ED}{BW \times AT}$$

where:

Intake	=	lifetime average daily exposure, mg/kg/day
C_w	=	concentration in groundwater, mg/l
IR	=	ingestion rate, 2 l/day
EF	=	exposure frequency, 350 days/year
ED	=	exposure duration, 1 year
BW	=	average body weight, 70 kg
AT	=	ED x 365 days/year for noncarcinogens
	=	70 years x 365 days/year for carcinogens

Assuming that the maximum concentration of hydrazine and UDMH estimated in the groundwater modeling (5.5 mg/l each) occurs in groundwater for a period of 1 year, and assuming that all drinking water is from contaminated groundwater, the lifetime average daily dose of hydrazine and UDMH would be 2.2×10^{-3} mg/kg/day for the carcinogen risk assessment and 0.15 mg/kg/day for the noncancer hazard index analysis. Applying the oral potency factors for hydrazine and UDMH (3.0 $(mg/kg/day)^{-1}$ and 0.3 $(mg/kg/day)^{-1}$, respectively) results in an overall cancer risk due to ingestion of contaminated groundwater of 7.3×10^{-3}, a risk significantly greater than the generally accepted insignificant risk level which is often defined as 1×10^{-6}.

Applying the noncancer acceptable exposure levels used in the risk assessment for hydrazine and UDMH (5.71×10^{-4} mg/kg/day and 5.71×10^{-4} mg/kg/day, respectively) results in a cumulative hazard index of 2.6×10^{6}, which is significantly greater than the nonsignificant hazard index level of 1.0. Thus:

> *"...the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the Ocean." For a spill involving 615 gallons of Aerozine-50 in a fully fueled Delta II rocket, this will occur within a period of about 1 year. Contamination of existing drinking water wells will not occur under this spill scenario, however, because these wells are located upgradient from the launch pads. This analysis does not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material (DEIS Volume I)."*

Spills Involving Kerosene. Groundwater modeling studies were conducted by HLA to evaluate spills involving 15,676 gallons of kerosene, a liquid fuel that is immiscible with water. The studies indicate that:

> *"...it [kerosene] would percolate vertically from the spill site and reach the groundwater approximately 15 days after the spill occurs. The daily amount of fuel reaching the water table would increase until about 40 days and then decrease asymptotically. Unlike Aerozine-50, the kerosene would float on the groundwater surface as a thin separate layer. It would spread laterally in the direction of the groundwater gradient, which is toward the shore. It would eventually migrate to the shore in a zone approximately 3,500 feet wide and cover an area on the water table of approximately 50 acres. The kerosene would seep into the ocean at the shore for a period of 3.3 years. The peak discharge rate for kerosene would be approximately 320 pounds per day along 3,000 feet of shore. (DEIS Volume III, Appendix B, page 19)."* Thus,

> *"...the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the Ocean." For a spill involving 15,676 gallons of kerosene in a fully fueled Atlas II rocket, this will occur within a period of about 3.3 years. Contamination of existing drinking water wells will not occur under this spill scenario, however, because these wells are located upgradient from the launch pads. This analysis does not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material (DEIS Volume I, page 5-134)."*

Soil and Water Degradation of Hydrazine and UDMH. The half-life of hydrazine in soil is listed as ranging from 1-7 days while the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992).

The half-life of hydrazine in groundwater is listed as ranging from 2-14 days while the half-life of UDMH in groundwater is listed as ranging from 16-44 days (Howard 1991). In the evaluation of spills involving Aerozine-50, it is estimated that after a spill at the launch pad, the Aerozine-50 would reach the shore approximately 20 days later and continue discharging with the groundwater for about a year. After a period of 20 days, however, only about one-half of the original amount of hydrazine would be in the groundwater due to aquatic degradation and after a period of 40 days, one-half of that amount would remain along with one-half of the original amount of UDMH. Thus, discharge of these substances with groundwater would diminish over time due to aquatic degradation.

Summary of On-Site Spills. The preceding analyses of on-site spills represent a conservative overestimation because the mitigating effect of the concrete launch pad is not considered in the evaluations. In other words, these analyses do not assume any containment, barrier, or other obstacle to the downward migration of the spilled material. Thus, contamination of existing drinking water wells will not occur under these spill scenarios, however, because the wells are located upgradient from the launch pads. In addition, these analyses do not consider the mitigating effect of the concrete launch pad on the vertical migration of the spilled material.

12-243

TRANSPORTATION SPILLS

Background and Overview. The intended transportation route from Hilo Harbor to Palima Point is via Highway 11. The transportation route, which is about 52 miles long, goes through Hilo, Mountain View, Pu`u Makaala, Volcano, Ka`u Desert, Wood Valley, and Pahala. Representative potential accident locations considered in the analysis are shown on Figure V-2.1 of Volume I of the dEIS.

As stated in the dEIS, transportation of liquid propellant chemicals is regulated by the U.S. Department of Transportation and hazardous drums and cylinders must conform to DOT specifications. 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to puncture because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials. According to ACTA (Appendix VIA):

> *"...the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."*

ACTA concluded that, based on federal regulations for proper bracing of containers

during transit, the rupture of more than 1 drum or 1 cylinder per truck accident is considered to be unlikely.

Accident rates along the transportation route were based on accident statistics for each road segment evaluated for all vehicle types, which is likely to be an overestimate of the truck accident rate.

> *"Historically trucks carrying hazardous materials have a lower accident rate than that for other vehicles (DEIS Volume I, page 5-39)."*

Transportation Spills Involving Aerozine-50. Groundwater contamination may occur as a result of an unmitigated on-or off-site transportation accident in which rocket fuel percolates vertically from the spill site into the groundwater. A transportation accident involving 1 barrel of Aerozine-50 would involve 55 gallons of spilled fuel.

Groundwater modeling studies conducted by HLA are based upon a spill of 615 gallons of Aerozine-50 at the launch pad (which is located approximately 1,500 feet from the shore). The maximum peak groundwater concentration due to a spill of this magnitude estimated by HLA would be approximately 11 milligrams per liter (mg/l) and the Aerozine-50 would reach the shore approximately 20 days after the spill occurred and continue discharging with the groundwater for about a year.

Certain assumptions were made and applied to the groundwater modeling results reported by HLA in order to estimate the groundwater concentration that would result due to an unmitigated spill of 55 gallons of Aerozine-50. It is assumed that 55 gallons of spilled fuel will act in the same way as 615 gallons of spilled fuel and that, since 55 gallons is approximately 10-fold less than 615 gallons, the resulting groundwater concentration should be approximately 10-fold lower, or 1.1 mg/l (0.55 mg/l hydrazine and 0.55 mg/l UDMH).

Assuming a groundwater concentration of 1.1 mg/l, the lifetime average daily dose of hydrazine and UDMH would be 2.2×10^{-4} mg/kg/day for the cancer risk assessment and 0.015 mg/kg/day for the noncancer hazard index analysis. Applying the oral potency factors for hydrazine and UDMH (3.0 $(mg/kg/day)^{-1}$ and 0.3 $(mg/kg/day)^{-1}$, respectively) results in an overall cancer risk due to ingestion of contaminated groundwater of 7.3×10^{-4}, a risk significantly greater than the generally accepted insignificant risk level which is often defined as 1×10^{-6}.

Applying the noncancer acceptable exposure levels used in the risk assessment for hydrazine and UDMH (5.71×10^{-4} mg/kg/day and 5.71×10^{-4} mg/kg/day, respectively) results in a cumulative hazard index of 2.6×10^{5}, which is significantly greater than the nonsignificant hazard index level of 1.0. Thus, as stated Volume I (page 5-134), *"the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the ocean."* This may occur within a period of about 1 year.

It should be noted that the above analysis does not take mitigation into consideration. As stated throughout the dEIS, a HAZMAT team will accompany all

shipments of toxic fuels. *"It is assumed that within a 15-minute blanketing time, the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it (Volume I, page 5-45)."*

Due to the quick clean-up and removal by the HAZMAT team accompanying the transportation truck, it is anticipated that minimal impacts will occur to soil and groundwater due to spilled material.

Transportation Spills Involving Kerosene. Groundwater contamination may occur as a result of an unmitigated on- or off-site transportation accident in which spilled kerosene percolates vertically from the spill site into the groundwater. A transportation accident involving 1 tankload of kerosene would involve 4,000 gallons of spilled fuel.

Groundwater modeling studies conducted by HLA are based upon a spill of 15,676 gallons of kerosene at the launch pad (which is located approximately 1,500 feet from the shore). It is stated in Volume I (page 5-134) that *"the groundwater will be unsuitable for drinking water supplies without treatment until the contaminants have completely discharged into the ocean."* For a spill involving 15,676 gallons of kerosene in a fully fueled Atlas II rocket, this will occur within a period of about 3.3 years.

Certain assumptions were made and applied to the groundwater modeling results reported by HLA in order to estimate the groundwater concentration that would result due to an unmitigated spill of 4,000 gallons of kerosene. It is assumed that 4,000 gallons of spilled fuel will act in the same way as 15,676 gallons of spilled fuel and that, since 4,000 gallons is approximately 4-times less than 15,676 gallons, the time for complete discharge of contaminants in to the ocean would be less than 3.3 years.

Effects on Agriculture. The effects of use of groundwater contaminated with Aerozine-50 or kerosene for agricultural irrigation are unknown. Field studies would have to be conducted to determine the potential for adverse effects to agricultural plants (specifically macadamia nut trees) due to exposure to hydrazine, UDMH or kerosene in water. In order to protect the health of agricultural workers who may come into contact with contaminated irrigation water, it would be prudent not to use this contaminated groundwater for irrigation purposes. This would in turn protect agricultural crops from any unknown potential detrimental effects.

Again, it is stressed that all precautionary measures and emergency response procedures will be utilized to limit the potential for groundwater contamination due to spills of rocket propellants In the unlikely even that groundwater used for drinking or agricultural purposes becomes contaminated, the supply should not be used until it has been neutralized to meet or exceed minimum drinking water quality standards required by the State Department of Health, Hawaii County and EPA. The spaceport operator would be required to provide an alternate source of safe drinking and irrigation water to the affected parties until the contaminated groundwater is deemed safe. The operator may

also be required to institute a water quality monitoring program for the on-site wells to help assure the long-term quality of the groundwater supply.

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Attachment B

POTENTIAL ADVERSE EFFECTS OF HCl ON MACADAMIA NUT ORCHARDS AT PALIMA POINT

By

Risk Science Associates
August, 1994

12-245

BACKGROUND AND OVERVIEW

The potentially toxic substances released by a normal rocket launch include hydrogen chloride gas (HCl) and aluminum oxide (Al_2O_3). Of these two substances, only HCl is considered a threat to plant life. The Ecological Risk Assessment (DEIS Appendix VIIIB, Section 5.1.1) characterized the potential risk to plant receptors from HCl liberated during a normal launch within a 15 km (9 mile) zone of ecological concern. The report concluded that toxicity from exposure to to HCl was minimal. The following analysis focuses on the potential adverse effects of HCl from normal launches on macadamia nut orchards near the proposed Palima Point launch site specifically.

HCl's mechanism of phytotoxicity is two-fold. First, chloride ions can affect enzyme activity, thus reducing the yield and quality of plants (Guderian 1977). While excess chloride can reduce chlorophyll (which results in chlorosis or, in extreme cases, destroys chlorophyll resulting in necrosis), chloride is also considered a plant micro-nutrient and has low phytotoxicity in comparison to other ions such as fluoride (Guderian 1977). Second, HCl produces adverse effects due to the presence of free hydrogen ions (Jacobson 1984).

The majority of plant physiology research on gaseous HCl and acid precipitation has focused on injury to foliage. The emphasis in the following discussions will be on causes of injury to the plant leaf. While the general mechanism of injury may also apply to other plant structures--such as flowers, fruits and nuts--the severity of the response of other plant structures will depend on their sensitivity. For example, the hard shells of mature macadamia nuts are likely to be less sensitive than the flower petals.

The severity of the effect of foliar lesions on other aspects of the plant (e.g. reductions in growth) is also influenced by the age and life-history stage of the plant when exposed. Young plants and developing leaves are more susceptible to damage than are mature ones (Haines et al 1980). Young plants that are rapidly developing may have reduced growth when leaf surfaces are injured. Fruit and seeds may compete for reduced photosynthate from injured leaves to the detriment of new root and leaf development (Jacobson 1984).

HCl released during a launch can be transported to Macadamia trees in two ways. It can either be dry deposited onto leaf surfaces via diffusion, or it can dissolve into fog, mist or rain droplets and contact leaf surfaces through wet deposition (Kerstians et al. 1992). For normal launches that take place during fair weather, macadamia trees will be exposed to gaseous HCl through dry deposition. If it rains during or right after a launch, then macadamia trees will be exposed via wet deposition. The following sections summarize the effects of dry and wet deposition of HCl on plants in general, and on macadamia nuts specifically.

DRY DEPOSITION

When HCl is dry deposited on plant surfaces, leaves uptake the majority of gaseous HCl through stomatal pores, or to a lesser extent through the cuticle (Kerstians 1992); this generally results in internal injury to the leaf. When high concentrations of gaseous acids are present, rapid absorption can lead to acidification at the stomata and necrosis of nearby foliar tissues; at lower concentrations, foliar chlorosis occurs (Guderian 1977). Chlorosis is the result of disruption of the ultrastructure of the chloroplast and the reduction in chlorophyll or inhibition of photosynthesis (Guderian 1977).

Table 1 summarizes toxicological data from chronic and acute exposure of different plant species to gaseous HCl. Generally, plants exhibit minimal adverse effects when chronically exposed to less than 0.07 ppm of gaseous HCl. Acute exposures of less than 3 ppm generally result in no visible injury.

It is unlikely that macadamia trees near Palima Point will suffer adverse effects due to exposure to gaseous HCl released during a normal launch due to the following.

- The highest 30-minute time mean HCl concentration estimated from a normal launch within 15 km of the launch pad is 0.23 ppm. This is an order of magnitude less than the chronic no observable effects level (NOEL).
- Exposure to gaseous HCl is likely to be very short (directly after a launch) with long periods between exposure to ambient air. When exposure is interrupted, plants are generally able to recover (Guderian 1977).
- Macadamia orchards near Palima Point are also exposed to other H^+ ions in gaseous acids released from Kilauea Volcano located in nearby Hawaii Volcanoes National Park. Daily emissions of SO_2 from Kilauea are between 100 and 300 metric tons per day during non-active periods and 32,000 metric tons per day during eruptions (Morrow et. al. 1991). The small quantity of HCl released after a normal launch can be considered trivial in comparison.
- Macadamia orchards near Palima Point are also exposed daily to non-anthropogenic sources of CL^- ions. High concentrations of CL^- ions are normally found in the atmosphere near the ocean. In other parts of the world, CL^- ions have been measured between 0.1 and 54.4μ g/m^3.

WET DEPOSITION

Background. The primary site of action for wet deposition of HCl is the epidermis of the plant. Generally, such foliar injury is located near vascular tissue and trichomes (an outgrowth of the epidermis such as hair or scales) on the leaf

surface. The capacity of acid precipitation to adversely affect plants depends on leaf characteristics. Species with very waxy cuticles are generally less sensitive to injury (Berg 1987). Macadamia leaves, however, do not have very waxy cuticles (Nagao et al. 1992).

Initially, external foliar injury consists of lesions which progressively deteriorate through the leaf producing necrotic spotting (Evans et. al. 1977). There is also a concomitant increase in the leaching of minerals from injured leaves (Wood & Bormann 1975; Keever & Jacobson 1983). As more and more leaf area becomes necrotic, the productivity of the plant decreases. This is manifested in severely injured plants by decreased growth, reduced yields and delayed maturity (Musselman & Sterrett 1988).

Phytotoxic effects of HCl deposited via wet deposition are mainly due to the free hydrogen ion concentration found in solution (Jacobson, 1984), therefore, this analysis of wet deposition will focus on the effect of free hydrogen ions (e.g., pH) on macadamia trees.

Foliage. The majority of research on acid precipitation has focused on effects to leaf surfaces or foliage. Generally, leaf necrosis can be induced by precipitation of a pH below 3; severe necrosis is seen at levels below 2 (Musselman & Sterrett 1988). The extent of foliar injury is related to the number of free hydrogen ions available in the precipitation and on the species of plant exposed. For example, broad-leaved trees are more sensitive than conifers and the foliage of broadleaved herbaceous plants are more sensitive than the foliage of woody herbaceous plants (Evans & Curry 1979). Dicots are generally more sensitive than monocots; within dicots, the most sensitive crop species (in descending order) are (1) root, leaf, cole and tuber crops and (2) forage, grain and fruit crops (Lee et. al. 1981). Macadamia nut trees are broad-leaved, woody dicots.

Flowers. Because flowers are composed of tender, fleshy structures and have a low buffering capacity, they are expected to be extremely sensitive to acidic precipitation (McCool et. al. 1990). Flower injury was observed in zinnias (*Zinnia elegans*), chrysanthemums (*Chysanthemum sp.*) and carnation (*Dianthus caryophyllus*) at pH below 4.0 when exposed to single exposures of acidic fog (McCool et. al. 1990). Foliar injury also occurred in zinnia foliage at a pH of 4.0 (Keever & Jacobson 1983).

Fruit & Nuts. Acid rain can affect the development of fruit as well as its marketability (Forsline et. al. 1983). In apples (*Malus domestica*), lesions were reported on fruit exposed to acidic precipitation of a pH of 3 (Proctor 1983). In grapes, vines exposed to a pH of 2.5 had significantly less percent soluble solids at harvest than control fruit (Forsline et. al. 1983).

Seed quantity and seed quality were reduced in soybean crops exposed to acid rain of a pH <4. The decrease in seed yield was due to a decrease in the number of mature seed pods and not in the number of seeds/pod or the mass of individual seeds. It was not known whether the decrease in mature pods was due to a decrease in soybean flower pollination, a decrease in pod retention or inadequate development of young pods (Evans et. al. 1981).

While the limited available studies show that there may be an effect on fruit when exposed to acidic precipitation, it remains unclear whether this is economically important. In grapes, there was a decrease in pollen germination in plants exposed to solutions of pH of 3.25, however, there wasn't always a corresponding decrease in fruit set and most vines need to be thinned of fruit anyway (Forsline et. al. 1983). In apples, exposure to acid precipitation below a pH of 3 injured flowers. Apple trees, however, need only about 10 percent of the flowers to set fruit to produce a normal yield; thus, adverse economic effects may be undetectable (Proctor et. al. 1983).

Summary. It is unlikely that macadamia nut trees near Palima Point will suffer adverse effects due to wet deposition of HCl released during a normal launch due to the following:

- As shown in Table 2, significant injury to leaves and flowers occurs at a pH of less than 4. It was estimated that the pH of rain falling after a launch would be about 5.5. It is unlikely, therefore, that wet deposition after a normal launch would cause an adverse effect to macadamia nut trees in the vicinity.

  As stated in the dEIS (Appendix VIIIB, Section 3.2.1), the amount of HCl available for wet deposition during a normal launch is calculated in the following manner:

  Assumptions.

  10.57×10^7g of solid rocket fuel is present in the nine solid rocket boosters (SRBs) of the Delta II 7925 vehicle and the mass fraction of hydrogen chloride is 0.1589.

  The HCl present in the fuel of six of the nine SRBs - the number of SRBs that are ignited on the ground - is available for wet deposition. (Once ignited, these six SRBs burn for the first 63 seconds of vehicle ascent. After 20 seconds, however, the rocket exhaust is above the cloud layer and therefore is not available for wet deposition to the ground (Nyman pers. comm. 1992)).

  The HCl released during a normal launch deposits to a land area within a 10 km radius of the launch pad.

  In the event that it begins to rain immediately after launch, the released HCl is carried to the ground in one inch of rainfall.

  Calculations of Wet Deposition from a Normal Launch.

  The mass of HCl available for wet deposition is determined by the following equation:

  $(10.57 \times 10^7\text{g})(0.1589)(6/9)(20\text{ sec}/63\text{ sec}) = 3.55 \times 10^6\text{g HCl}$

Based on the rate of deposition of HCl within the 10 km area, the mass of HCl that will be deposited by rain on 1 square meter can be determined (0.003 g). The volume of water that falls on 1 square meter during the one inch rainfall is 25.39 liters and the concentration of HCl due to wet deposition can be calculated (0.12 mg/l).

The pH of rainfall produced during a wet deposition event can be calculated by the following:

$$pH = -\log[(C \times 1/MW) \times 1\text{ mole}/1000\text{ millimoles}]$$

where
C = concentration of HCl in surface water in mg/l
MW = molecular weight of HCl (36.5 mg/millimole)

For a normal launch scenario, the pH of rainwater would be:

$$pH = -\log[(0.12\text{ mg/l} \times 1/36.5\text{ mg/millimole}) \times 1\text{ mole}/1000\text{ millimoles})]$$
$$pH = 5.5$$

- Although rainwater below a pH of 5.6 is considered acidic, the contribution of rocket exhaust clouds to the formation of acid rain around Palima Point may be minimal because acid rain is also formed through the liberation of sulphates and nitrates through volcanic activity. A study of acid rain in the area around Volcanoes National Park measured the pH of rainwater and found that the pH varied between 2.6 and 4.6 during the study period (Nachbar-Hapai et al. 1989). Thus, normal rainfall in the area is already more acidic.

- Even if wet deposition of HCl after a normal launch did injure macadamia flowers, immature fruit or foliage, it is unclear what economic effect, if any, it would have. As summarized within Nagao & Hirae (1992), a fifteen-year-old macadamia nut tree produces approximately 10,000 racemes; each raceme has 300 flowers. Only 6 to 35 percent of these flowers set fruit and only 0.3 percent of these flowers develop into mature fruit. Trees fluctuate in the number of racemes and flowers they produce every year. With optimum growing conditions, however, the total number of mature fruit per tree is about the same every year. Thus, there is the possibility that even if flowers are injured, fruit yield may remain constant.

SUMMARY

It is unlikely that macadamia nut trees located near Palima Point will be adversely affected by the release of HCl during normal rocket launches at the proposed spaceport.

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Table 1: Effects of Gaseous HCl on Plants

Plant Species	Average Concentration (ppm)	Exposure time (hrs)	Injury	Reference
Grape	0.05	90	slight necrosis and chlorosis	1
(Vitis vinifera)	0.19	114	severe necrosis	1
Rowan Tree	0.05	90	slight necrosis	1
(Sorbus intermedia)	0.19	114	medium necrosis	1
Horse chestnut	0.05	90	slight necrosis	1
(Aesculus hippocastanum)	0.19	114	medium necrosis	1
Poplar sp.	0.05	90	slight necrosis	1
(Populus sp.)	0.19	114	medium necrosis	1
European Beech	0.05	90	very slight necrosis	1
(Fagus silvatica)	0.19	114	medium necrosis	1
Black locust	0.05	90	very slight necrosis	1
(Robinia pseudoacacia)	0.19	114	slight necrosis	1
Hazelnut	0.08	140	slight necrosis	1
(Corylus avellana)	0.13	150	medium necrosis	1
Cut-leaved Birch	0.07	229	slight necrosis	1
(Betula verrucosa)	0.12	228	medium necrosis	1
Basswood	0.07	229	slight necrosis	1
(Tilia platyphyllos)	0.12	228	medium necrosis	1
Hedge Maple	0.07	229	very slight necrosis and chlorosis	1
(Acer campestre)	0.12	228	slight necrosis	1
Ginko	0.07	229	no injury	1
(Ginko biloba)	0.12	228	slight necrosis	1
English Oak	0.07	229	no injury	1
(Quercus pedunculata)	0.12	228	very slight necrosis	1
White pine	0.05	90	no injury	1
(Pinus strobus)	0.19	114	slight necrosis	1
	8	4	tip necrosis	2
Balsam, douglas fir	12	4	tip necrosis	2
Norway Spruce	19	4	tip necrosis	2
Austrian Pine	18	4	no effect	2

Table 1: Effects of Gaseous HCl on Plants

Plant Species	Average Concentration (ppm)	Exposure time (hrs)	Injury	Reference
Arborvitae	43	4	no effect	2
Tuliptree	3	4	marginal leaf necrosis, necrotic flecking	2
Black Cherry	6	4	marginal leaf necrosis, necrotic flecking	2
European Black Alder	6	4	marginal leaf necrosis, necrotic flecking	2
Norway and Sugar Maple	7	4	marginal leaf necrosis, necrotic flecking	2
Red Oak	13	4	no effect	2
Tomato	4	2	severe injuring, bronzing	3
	10	2	severe injuring, bronzing	3
	5	2	marginal leaf necrosis, injury to petiole	3
	10	2	marginal leaf necrosis, injury to petiole	3
	3	2	glazing on underside of leaf, tipburn, necrotic flecking	3
	8	3	glazing on underside of leaf, tipburn, necrotic flecking	3
	2 to 5	2 to 3	no visible injury	3
	8.5	3	no visible injury	3
	0.7	10 hr/day, 2 days	Chlorosis (generally interveinal; mostly in leaves	4
	0.4	8 hr/day, 6 days	Chlorosis during summer months	4
	0.4	8 hr/day, 6 days	no visible symptoms during winter months	4
Crysanthemum	8 to 23	2.4	severe injuring, bronzing	3
	3.5	3	marginal leaf necrosis, injury to petiole	3
	8.5	3	marginal leaf necrosis, injury to petiole	3

Table 1: Effects of Gaseous HCl on Plants

Plant Species	Average Concentration (ppm)	Exposure time (hrs)	Injury	Reference
	6	5	glazing on underside of leaf, tipburn, necrotic flecking	3
	12	2	glazing on underside of leaf, tipburn, necrotic flecking	3
	2.7	2 or 3	no visible injury	3
Broad Beans (Vicia faba)	0.06	360	reduced yield	1
Lupine (Lupinus luteus)	0.12	360	reduced yield	1
Spinach (Spinacia oleracea)	0.12	360	reduced yield	1
Winter Rye (Secale cereale)	0.18	360	reduced yield	1
Red clover (Trifolium pratense)	0.08	47	reduction in growth	1
Radish (Raphanus sativus)	0.08	140	20% reduction in yield	1
Sensitive Plants (species ?)	0.03	300	no visible injury	1

1 = Guderian 1977
2 = Means & Lacasse 1969
3 = Shriner 1969
4 = Godfish & Lacasse 1970

Table 2: Selected Toxicological Studies on the Phytotoxicity of Acid Precipitation

Species	Maximum pH level producing injury	Toxicological Endpoint	Reference
Seedless Vascular Plants			
Bracken Fern *Pteridium aquilinum*	2.5	after 10 rainfalls of 20 min. 18% of the surface area of young fronds were injured	Evans & Curry 1979
Seed Vascular Plants			
Monocot			
Spiderwort (Tradescantia sp.)	2.3	After 16 rainfalls of 20 min each between 2.3 and 5% of the leaf area showed injury. Hypertrophy of mesophyll cells was also found	Evans & Curry 1979
Dicot			
Pin Oak (Quercus palustris)	2.5	Insensitive to foliar injury	Evans & Curry 1979
Soybean(Glycine Max)	2.9	After 6 20 min daily exposure about 7% of the leaf surface showed lesions	Evans & Curry 1979

Table 2: Selected Toxicological Studies on the Phytotoxicity of Acid Precipitation

Species	Maximum pH level producing injury	Toxicological Endpoint	Reference
Bean (Phaseolis vulgaris)	3.1	Foliar damage	Evans et al 1977
Sunflower (Helianthus annuus)	3.1	Foliar damage	Evans et al 1977
Yello Birch Seedlings (Betula alleghaniensis)	3	Foliar tissue damage and reduction in plant growth after 11 weeks of treatment	Wood & Boorman 1974
Radish (Raphanus sativus)	2.5	Reduced leaf area and dry weight after 7 applications of acid rain (in total 4 cm of precipitation)	Harcourt & Farrar 1980
Corn pollen (Zea mays)	4.5	Reduced corn pollen germination in a liquid medium	Zhang & Craker 1991
Mountain birch pollen (Betula pubescens ssp. tortuosa)	4	Reduction in percent pollen germination in the laboratory	Neuvonen et. al. 1991
Mountain birch pollen (Betula pubescens ssp. tortuosa)	4.6	Reduction of pollen tube length in the laboratory	Neuvonen et. al. 1991

Table 2: Selected Toxicological Studies on the Phytotoxicity of Acid Precipitation

Species	Maximum pH level producing injury	Toxicological Endpoint	Reference
Apple seedlings (Malus hupehensis)	2.75	Growth reduction and foliar injury	Forsline et. al. 1983
Mature apple trees (Malus domestica)	3	Visible foliar damage	Proctor 1983
Valencia orange (Citrus sinensis L. cv. Valencia)	3.2	trace of foliar necrosis	Musselman & Sterrett 1988
Flowers			
Apple flowers (Malus domestica)	3	Injury to petals. Induction of brown necrotic areas and red lesions	Proctor 1983
Zinnia flowers (Zinnia elegans)	4	flower injury	McCool et.al.1990
Carnation and crysanthemum flowers (Dianthus caryophyllus & Chrsanthemum sp.)	3.5	flower injury	McCool et.al.1990
Zinnia (Zinnia elegans)	2.8	flower injury when exposed 30 min/day twice a week for 6 weeks	Keever & Jacobson 1983

Table 2: Selected Toxicological Studies on the Phytotoxicity of Acid Precipitation

Species	Maximum pH level producing injury	Toxicological Endpoint	Reference
Fruit			
Apples (Malus domestica)	3	Reduced fruit quality	Proctor 1983
Apples (Malus domestica)	2	blemishes on fruit, premature ripening and fruit drop	
Soybean (Glycine max)	4	decreased seed yield	Evans et. al. 1981
Soybean (Glycine max)	<3	decreased seed quality	Evans et. al. 1981

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APPROPRIATE PARTIES

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FILE

INFORMATIONAL NETWORK FOR THE SPACEPORT
POST OFFICE BOX 588
NAALEHU HAWAII 96772-0588

The Honorable John Waihee
Governor, State of Hawaii
Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

RE: Draft Environmental Impact Statement
TITLE OF PROJECT: CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY

COMMENTS:

1) While Informational Network for the Spaceport (INFS) has correspondence from then OSI Director George Mead stating INFS had "consulted party" status on the spaceport EIS, but on page II-4 under item D., Other Consulted Parties, INFS is not listed.

Why, despite reassurances by OSI that we would be consulted parties, were we overlooked in the rush to complete this EIS?

2) There are gross inadequacies with this ten-volume document, too numerous to detail. The broad areas of my concern include the lack of on-site air and weather monitoring and lack of provisions for on-going monitoring; the lack of "worse-case disaster scenarios" though the "best case", least possible damages from spills and accidents presently in the EIS, show considerable damage being done; need for consideration of historical sites throughout the spaceport complex; unmitigatable natural disaster hazards that would place all residents of Ka'u in added toxic chemical danger without hope of ready civil defense access; and highway hazards and annoyance from slow moving convoys.

3) No accurate cost-benefit projections show the viability of the project. In fact, the absence of private-sector developers demonstrate the lack of financial despite heavy monetary support from DBEDT.

4) That HSDA and the Space Advisory Committees would maintain, with the support of the Attorney General, that they were exempt from the "open meeting" laws demonstrates why the community and their local County government does not trust OSI.

The attached brochure reprinted from one circulated by the HSDA shows that DBEDT considered HSDA an operational body of their agency. That DBEDT should then claim that it is then exempt from legislated statutes calling for the keeping of public records and holding open meetings is an insult to all State taxpayers whose lives have been affected by HSDA activities.

5) Why would additional funds be wasted on pursuing more studies on this project that already is so obviously flawed that even the Hawaii County Council is unanimously calling for no more spending on the EIS?

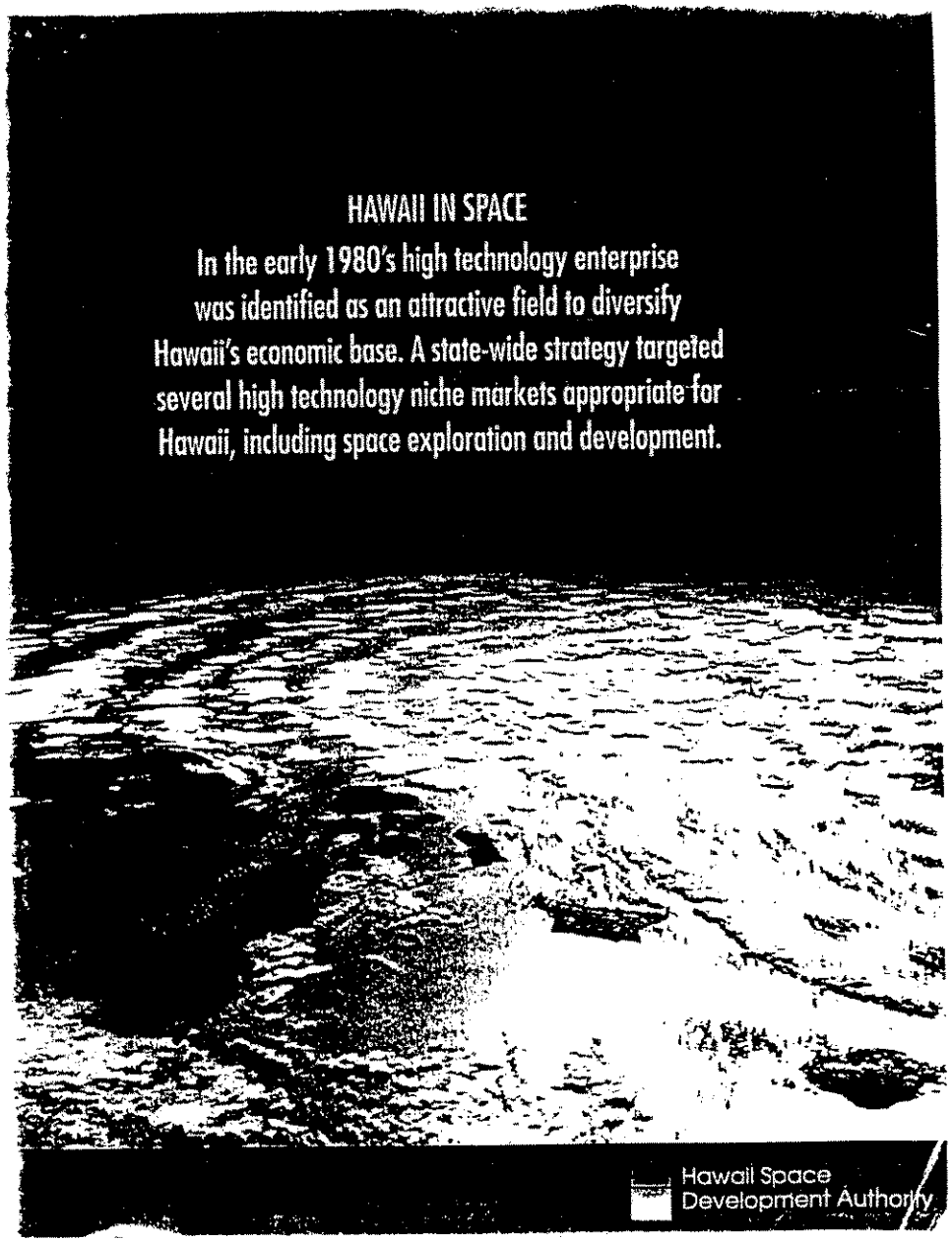
6) Why should any more funding be spent on a project that has aroused such on-going opposition from the affected community, and, indeed, state-wide?

This organization urges that the DEIS not be accepted and that no further funding be granted for this project.

Sandra L. Demoruelle

Sandra L. Demoruelle
Project Coordinator
Informational Network for the Spaceport
P.O. Box 588
Naalehu, HI 96772-0588

12-253



The State of Hawaii is involved in numerous space-related activities which have established the State as a recognized leader in many areas of space science and technology. The clear skies afforded by Mt. Haleakala on Maui, and Mauna Kea and Mauna Loa on the Big Island of Hawaii have enabled the state to become an international center for astronomy and astrophysics. The University of Hawaii's Institute for Astronomy coordinates and sponsors a wide range of space-related programs. The University has been designated as a Center of Excellence for NASA's Solar System Exploration and Remote Sensing Programs. Its Planetary Geosciences Division is playing a vital role in many earth observation and planetary exploration programs. As one of twenty-one universities nationwide to be designated as a Space Grant College, the University of Hawaii is developing a broad range of space-related curricula.

During its 25-year history, NASA's Koke'e Tracking Station on the Island of Kauai provided support to the Mercury, Gemini, Apollo and Shuttle manned spaceflight programs as well as numerous unmanned satellite projects.

The Navy's Pacific Missile Range Facility (PMRF) at Barking Sands, Kauai, maintains tracking instrumentation used to support both military and NASA missions. Sub-orbital rockets are launched from PMRF to fly experimental payloads above the earth's atmosphere.

The Air Force operates facilities on Mt. Haleakala, Maui, for detecting, tracking and cataloging man-made objects in space as well as conducting research in electrophysics and advanced sensor technologies.

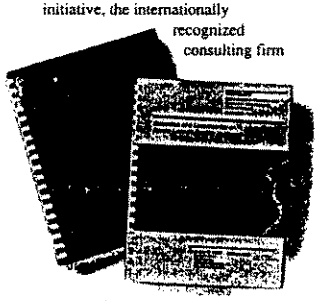
Hawaiian companies are under contract to numerous private and governmental organizations to develop both hardware and software for telecommunications, data processing and remote sensing systems.

MISSION

To further enhance Hawaii's role in space-related industries, Governor John Waihee, in his 1987 inaugural speech, directed the State to investigate space-related activities which would be most appropriate for Hawaii. His goal is designed to:

- Diversify and strengthen the economy of the State of Hawaii;
- Provide training and career opportunities in high technology fields within the State for Hawaii's youth; and,
- Build on the existing space-related research at the observatories at Mauna Kea and Haleakala, and at the University of Hawaii.

In response to the Governor's initiative, the internationally recognized consulting firm of Arthur D. Little was contracted to prepare a comprehensive evaluation of Hawaii's potential for space exploration and development. Completed in August of 1987, the ADL report considered a broad range of economic, technical, environmental, social and cultural factors in making its recommendations. Among the six major areas of space industry involvement recommended by ADL was that the State could facilitate the development of launch services for small- and mid-sized commercial and scientific satellites.



Studies prepared by Arthur D. Little.

Kahilipali Point

LAUNCH SERVICES

Arthur D. Little was subsequently contracted to select those locations suitable for operation as a commercial launch facility, and to recommend a preferred and alternative site. The ADL site selection study was completed in April 1988. Seven sites on the Big Island of Hawaii were evaluated for the ability to launch safely into polar and equatorial orbit. In addition to safety and launch operations considerations, the sites were also evaluated on the basis of information about their geological, environmental, cultural and archaeological characteristics as well as the availability and need for supporting infrastructure.

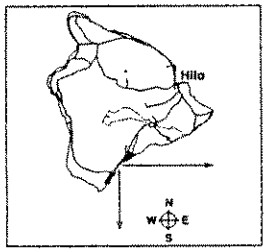
Of the seven sites, two were identified as meeting the criteria for safe launch operations with Palima Point named as the preferred site and Kahilipali Point as the alternative.

In December of 1988, the engineering consulting firm of CH2M Hill was contracted to prepare a Master Plan detailing a conceptual facilities layout for the proposed space launch facility, as well as to assess the environmental effects, risks, and constraints associated with this operation.

PRELIMINARY SAFETY ASSESSMENT

The Commercial Space Launch Act of 1984 authorized the U.S. Secretary of Transportation to oversee and coordinate commercial launch activities in the United States. The U.S. Department of Transportation Office of Commercial Space Transportation (OCST) was requested by the Hawaii Space Development Authority to perform a preliminary evaluation to determine whether launch activities could be safely conducted from either Palima Point or Kahilipali Point. The review conducted by OCST included a site visit by a team comprised of OCST licensing, safety, launch systems and environmental experts.

In September, 1989, OCST concluded that "both sites appear acceptable from a safety perspective as candidate commercial launch sites."



Launch azimuths from proposed Hawaii sites.

LAUNCH PROJECT STRATEGY

The State has contracted with MCM Planning, a local firm with expertise in land use, planning and environmental concerns, to prepare a joint federal/state environmental impact statement for the proposed spaceport. The Hawaii site is being sized to accommodate two medium launch vehicles, one small space launch vehicle and one sounding rocket.

The EIS will also address impacts associated with facilities necessary for the direct or indirect support of launch operations.

A single site will be selected prior to filing the Draft Environmental Impact Statement (DEIS) in mid-1991. The Final EIS (FEIS) is expected to be submitted for the Governor's acceptance by the end of the year. Following FEIS acceptance, eighteen months will be needed for permitting and land consolidation.

The State of Hawaii is prepared to provide off-site infrastructure improvements. Efforts by the Hawaii Space Development Authority are underway to organize an international consortium to finance, design, develop and operate the launch facility. The facility could be constructed and ready to support a small expendable launch vehicle (ELV) launch as early as 1994. Medium ELVs could be launched as early as 1995.

BUSINESS INNOVATION

The Hawaii Space Development Authority supports a variety of projects designed to enhance cooperative space-related ventures among government, academia and the private sector. For example, funding and administrative assistance has been provided to the Pacific Space Center (PacSpace). This non-profit marketing and management institution was established to link technical expertise resident in Hawaii and around the Pacific Basin with space research and development opportunities worldwide. PacSpace is working with NASA Ames to identify potential projects including remote operation of sensing instruments, applications of automated processing techniques to remote sensing data, and development of an automated lunar prospector. PacSpace has also received a federal grant to design an innovative telecommunications program utilizing NASA's Advance Communications Technology Satellite (ACTS).

Advanced Communications Technology Satellite (ACTS).

SPACE EDUCATION

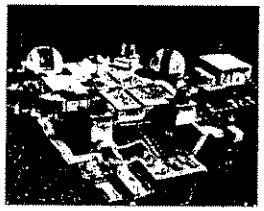
The Hawaii Space Development Authority is working with the State's Department of Education to strengthen students' skills and interest in various academic disciplines with space-related applications. Under the leadership of Mr. Art Kimura, Aerospace Education Resource Teacher and one of Hawaii's two finalists in NASA's Teacher-In-Space Program, thousands of students were able to participate in hands-on, interactive demonstrations integrating the basic principals of mathematics, science and computer technology with research and exploration. Mr. Kimura is currently working with HSDA to develop a pilot Hawaii-based space camp called "Future Flight" to be held during the summers of 1991 and 1992. It is hoped this project will lead to the development of a permanent facility offering simulated manned missions to the Moon and Mars.

Each year since 1987, the State of Hawaii has sponsored the Hawaii Space Pavilion, a major space exhibition in the Islands. The 1990 Pavilion featured a broad range ofspace exhibits sponsored by NASA space flight centers, the Jet Propulsion Laboratory, the California Museum of Science & Industry and the Kansas Cosmosphere & Space Center. Numerous exhibits were also presented by Hawaii-based organizations. Special school tours were hosted including special presentations by NASA astronauts and representatives.

1990 Hawaii Space Pavilion.

RESEARCH AND DEVELOPMENT

The Hawaii Space Development Authority has initiated several space R&D projects for Hawaii. Negotiations are in progress to explore new joint ventures under a consortium arrangement sponsored by the Universities Space Research Association. Its members include the University of Hawaii, the University of California at San Diego and the California Institute of Technology.



Science City on Mt. Haleakala

INTERNATIONAL COOPERATION

The Hawaii Space Development Authority is exploring innovative ways for our State to engage in multinational space-related activities, with an emphasis on making Hawaii a regional center for joint space ventures among countries around the Pacific Basin. In November 1990, a workshop on Japan-U.S. cooperation in space co-sponsored by HSDA and several U.S. and Japan-based organizations identified a series of potential programs in satellite communications and space R&D which could be pursued as joint ventures. An Advisory Committee has been established to identify and promote appropriate projects for Hawaii to pursue as part of the 1992 International Space Year. Three activities — an Asian/Pacific Space Exploration Symposium, production of a public television special on Hawaii in Space, and a Pacific Expo — are currently being introduced as bills for legislative funding.

Conference at the East-West Center.

The Search and Rescue Satellite-Aided (SARSAT) systems sponsored by the National Oceanographic and Atmospheric Administration (NOAA) monitor and support ocean and land rescue operations over much of the earth's surface. To extend these services to the Pacific Region, HSDA is working to establish a SARSAT ground station in Hawaii.

For more information contact:

Hawaii Space Development Authority

P.O. Box 2359
Honolulu, Hawaii 96804
Phone: (808) 548-3451
Fax: (808) 528-2823

12-255

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SEP. 30 1994

Ms. Sandra L. Demoruelle
Project Coordinator
Informational Network for the Spaceport
P.O. Box 588
Naalehu, HI 96772-0588

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Demoruelle:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-256

ACTA Inc., Decision Analysts Hawaii, Inc., and Risk Science Associates contributed to the following responses.

Comment: *While the Informational Network for the Spaceport (INFS) has correspondence from then OSI Director George Mead stating that INFS had "consulted party" status on the spaceport EIS, but on page II-4 under item D, Other Consulted Parties, INFS is not listed. Why, despite reassurances by OSI that we would be consulted parties, were we overlooked in the rush to complete this EIS?*

Response: On 11-9 of Volume II, the Informational Network for the Spaceport is listed under D, Organizations. INFS, like all respondents to the Notice of Preparation, had "consulted party" status. This is in accordance with the definition promulgated in the Environmental Impact Statement Rules, (Administrative Rules, Title 11, Chapter 200).

The dEIS was developed over a more than three year period; the implication that the EIS process was "rushed" is simply not true.

Comment: *There are gross inadequacies with this ten-volume document, too numerous to detail. The broad lack of on-site air and weather monitoring and lack of provisions for on-going monitoring; the lack of "worst-case disaster scenarios" though the "best-case", least possible damages from spills and accidents presently in the dEIS, show considerable damage being done; need for consideration of historical sites throughout the spaceport complex; unmitigatable [sic] natural disaster hazards that would place all residents of Ka'u in added toxic chemical danger without hope of ready civil defense access; and highway hazards and annoyance from slow moving convoys.*

Response: The studies conducted by ACTA and RSA did not consider "best case" least possible damages from spills and accidents, as you claim. In fact, the analyses considered many worst case accident scenarios, as examination of the main Volumes I and II, in addition to the appendices, will show. There is considerable experience in the United States with regard to the handling, storage and transportation of hazardous materials related to launch facilities. This experience was incorporated into the analyses and discussion of such potential accidents and their consequences as contained in the Appendices to the dEIS.

In the quantitative analysis of the transportation accident scenario, the type and magnitude of impacts were estimated. This analysis was conducted such that "catastrophic (and unlikely) events of instantaneous (15 seconds or less) spills of an entire tank, drum or cylinder were analyzed to evaluate the magnitude of the consequences and to consider possible risk management" (see page 5-41 of Volume I of the DEIS).

Reevaluation of the transportation accident scenario assuming spill of more than one barrel is not required nor would it be informative because spill of one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers: "The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I of the DEIS). An analysis of multiple drums spilled would just reaffirm the findings of significant risk.

According to Dr. Greenberg of Risk Science Associates, extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment. It must be remembered that the hazardous materials response team will travel in the convoy and be partially suited-up. Their efforts will be directed immediately toward spill containment after donning respirators and gloves. Anyone who has ever worn full protective equipment or who has even witnessed a hazardous materials response demonstration knows that a self-contained breathing apparatus can be donned and the protective suit sealed in a matter of minutes. In fact, the emergency response personnel consulted for this project stated that under these specific conditions of transportation, containment and covering of a one drum spill could be accomplished in 10 minutes.

The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (page 3-2 of Appendix VIA prepared by ACTA and page 5-54 of Volume I). According to ACTA, *"the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."* ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than 1 drum or 1 cylinder per truck accident is considered to be unlikely.

In over thirty years of transporting rocket fuels from the Mississippi River to Vandenberg Air Force Base, ACTA is aware of only a few instances where a release to the environment occurred. ACTA is not aware of any accident where more than one container was breached. Vandenberg Air Force Base receives many rocket fuel shipments each year from the Mississippi River and considerably more in both quantity and volume than would likely be transported within Hawaii. These shipments are highly controlled as regard to the route, hazmat teams, time of day, transporting vehicle speed, etc. Experience, therefore, does not suggest that the breach of more than one container is a reasonable and realistic. ACTA is not aware of even the breach of one 55-gallon drum of hydrazine in a transportation accident in over 30 years of operation of U.S. launch facilities.

Toxic releases from spills of liquid propellants on the launch facility site are evaluated on page 5-127 of Volume I of the dEIS. In the analysis it is assumed that the entire contents of a storage vessel is released under a multiple worst case scenario. The analysis is based on worst case meteorological conditions, a maximum vessel size of toxic propellants that could be released (615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide), that the propellants would not react, and that the spilled liquid is allowed to remain and evaporate over time with no effort made at remediation. The resulting cancer risk due to a hydrazine release under this accidental scenario (which could conceivably occur as a result of a natural disaster such as an earthquake, however, it is considered unlikely due to containment barriers) is 9.5×10^{-4}. The maximum acute hazard index is 10.6 at Pahala.

Thus, *"the individual cancer risk from just one on-site spill is significant. Acute and chronic adverse health effects in the surrounding community will also occur under unfavorable wind conditions from just one on-site spill"* (page 5-132 of Volume I of the dEIS). While there may be additional storage of these fuels as well as other toxic chemicals at other locations on-site, reevaluation is not required, however, because the spill described above has already been shown to result in significant impacts on nearby residents and workers. These risks do not account for the mitigating measures that will be in place for earthquake safety which are listed on page 5-135 of Volume I of the dEIS.

In the event of such a spill, the food chain will not be adversely affected because none of the substances potentially spilled are bioaccumulative (in other words, substances such as aluminum oxide, hydrogen chloride, and hydrazine do not accumulate in plants or in animal tissues such as meat or milk).

The rocket propellants will not accumulate in soil either. The soil half-life of hydrazine is listed as ranging from 1-7 days while the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992), indicating that hydrazine deposited to the soil will degrade rapidly.

We would also like to add that, should there be a volcanic eruption and/or earthquake of sufficient magnitude to destroy the spaceport and release the entire contents of the fuel storage facilities, the presence of hydrazine or other rocket fuels would be the least of Ka'u's worries.

It is simply incorrect to suggest that "best case" least possible damages from spills are the norm in the dEIS. On-site accidents would mainly be confined to the facility as specified in Volumes VII and VIII of the dEIS. This is consistent with many years of experience from other facilities located at distances from populated areas on the same order as proposed for Palima Point.

Comment: *No accurate cost-benefit projections show the viability of the project. In fact, the absence of private sector deveopers demonstrate the lack of financing despite heavy monetary support from DBEDT.*

Response: The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the available number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Historically, successful economic development occurs within a context of comparative economic advantage. As explained in the *Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii*, February 1993, Ch. 11, the principal comparative advantage offered by Hawaii is that a *single* launch facility can be used to place satellites into both equatorial and polar orbits. On the mainland, a new launch company must build and maintain two expensive launch facilities: one on the east coast for equatorial launches, and one on the west coast for polar launches.

This comparative economic advantage for Hawaii has attracted the interest of companies that wish to take advantage of recent advances in rocket-launching technology and have plans to place large "constellations" of communication satellites in low-earth orbit. These companies would be the likely market for a Hawaii launch facility. It should be noted that the military already possesses the capability to launch rockets to both polar and equatorial orbits.

The promotion of Hawaii's comparative economic advantages—combined with state and county assistance in securing the necessary development approvals—is the same approach that was used so successfully in attracting the astronomical telescopes to Mauna Kea. As mentioned in the cover letter, after completion of the EIS, the State of Hawaii does not

anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement would be the responsibility of the private developer. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Comment: *That HSDA and the Space Advisory committees would maintain, with the support of the Attorney General, that they were exempt from "open meeting" laws demonstrates why the community and their local county government do not trust OSI. The attached brochure reprinted from one circulated by the HSDA shows that DBEDT considered HSDA an operational body of their agency. That DBEDT should then claim that it is then exempt from legislated statutes calling for the keeping of all public records and holding open meetings is an insult to all state taxpayers whose lives have been affected by HSDA activities.*

Response: A lawsuit alleging that the Hawaii Space Development Authority had violated the "Sunshine Law" was found to be without merit and dismissed by Circuit Court Judge Watanabe on November 15, 1993.

Comment: *Why would additional funds be wasted on pursuing more studies on this project that is so obviously flawed that even the Hawaii County Council is unanimously calling for no more spending on the EIS? Why should any more funding be spent on a project that has aroused such on-going opposition from the affected community, and, indeed, state-wide?*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State funded the EIS to disclose the impacts of building a spaceport as a guide to State decision makers in determining whether or not resources should be allocated to site acquisition, permitting and further analytical studies related to the spaceport initiative. No further resources are being allocated for site acquisition, permitting and further analytical studies. The Department is, however, responding to comments received during the public review process.

References

Howard, P.H. 1991. Handbook of Environmental Degradation Rates. Chelsea, Michigan: Lewis Publishers, Inc.

Hazardous Substances Data Bank (HSDB). 1992. Electronic communication with HSDB of the National Library of Medicine.

KA LAHUI HAWAII
P. O. Box 1256
Pahoa, Hawaii 96778

September 27, 1993

Department of Business Economic
Development and Tourism
P. O. Box 2359
Honolulu, Hawaii 96804

Attention: Mr. Takeshi Yoshihara,
Deputy Director

Gentlemen:

Subject: Palima Point Conceptual Plan
For A Commercial Satellite Lauching
Facility

This is to give you Notice that Ka Lahui Hawaii will have a public hearing on the subject matter on October 30, 1993, at the Naalehu Community Center beginning at 9:00 a.m.

I have received the OEQC Bulletin and will adhere to the 90-day review of this project.

We request your Supplemental EIS document by the Federal/State as soon as you receive them.

Thank you for your assistance in this matter.

Sincerely Yours,

Clara L. Kakalia

(Mrs.) Clara L. Kakalia
Chair, National Land Committee

cc: Kia'aiana M. Trask
Clarence Kauahi, Island of
Hawaii Poo

12-260

KA LĀHUI HAWAI'I
National Land Committee
P.O. Box 1256 • Pahoa, HI 96778

November 18, 1993

Honorable John Waihee
Governor, State of Hawai'i
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, HI 96818

Mr. Takeshi Yoshihara
Deputy Director, DBED
P.O. Box 2359
Honolulu, HI 96804

Gentlemen:

RE: Palima Point - Conceptual Plan for a Commercial Satellite Launching Facility

At the Fourteenth Legislative Session of Ka Lāhui Hawai'i held on November 12-14, 1993 at Kilauea Military Camp, Hawai'i, the 'Aha 'Ōlelo Kānāwai (Legislature) adopted Resolution 36-93 entitled: Requesting No Rocket Launching Facility at Palima Point, Kā'ū, Hawai'i. As soon as our Kia'āina (Governor) certifies this Resolution, a copy will be transmitted to your office.

Ka Lāhui Hawai'i is the only sovereign nation of 19,000 plus citizens in the State of Hawai'i.

We unanimously OPPOSE this conceptual plan for a commercial Satellite Launching Facility at Palima Point, Kā'ū, island of Hawai'i.

We OPPOSE your Draft Environmental Impact Statement (D.E.I.S.) for the following reasons:

1. The hazardous conditions of transporting liquid fuel on our highways; one fuel spill and it becomes the "worst case" condition that will affect our health;

2. Jobs for this project are of those of highly and technically skilled nature and it will be for only those who are educated and trained with experience that would be employed;

3. It will affect the endangered green sea turtles (Figure 111-2.7) at Nahuluhulu Point, Kamehame and Makuka Bay;

4. It will also affect the Hawaiian hawksbill bird (pg. 3-41), (Figure 111-2.10) the anchialine pool; and other endangered species;

5. Land use zoning (page 3-24) - over 10,400 acres must be controlled by this project, however, we are concerned that it will affect Ka Lae Point which is Hawaiian Home Lands of 12,000 acres (historical and sacred lands);

6. Land acquisition and control - the State has not implemented as to whom, when and where they will acquire lands for this project (page 3-24 and page 3-26). Your mention of exchanging lands, leasing lands and the last resort to use eminent domain power of which we interpret as (aihue ka 'āina) stealing of lands.

7. Ceded Lands Trust - (page 3-26 and 3-27) "There is a strong possibility that the State-owned lands at the site are ceded lands." We are the beneficiary of these ceded lands and not the State. We oppose the use of our ceded lands for this project.

You do not address historical sites, burial sites, heiaus, petroglyphs, and most of all submerged lands along the coast of Palima. All submerged lands are ceded lands.

Ka Lāhui Hawai'i requests that you submit a full study on the above that pertains to Hawaiian rights.

We repeat, Ka Lāhui Hawai'i OPPOSES a space port in Kā'ū our most historical and sacred lands -- the beginning of the birth of our Nation in Kā'ū.

Sincerely yours,

Clara L. Kakalia

(Mrs.) Clara L. Kakalia, Chair
National Land Committee
Ka Lāhui Hawai'i

cc: Kia'aina M. Trask

12-261

JOHN W.
SC.
JEANNE K. SC
DIR
RICK E
DEPUTY DIR
TAKESHI YOSH
DEPUTY DIR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

SEP. 30 1994

Mrs. Clara L. Kakalia
Chair, National Land Committee
Ka Lahui Hawaii
P.O. Box 1256
Pahoa, HI 96778

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)- CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mrs. Kakalia:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Jon K. Matsuoka, Ph.D., Davianna McGregor, Ph.D., Richard Brock, Ph.D., and Decision Analysts Hawaii, Inc. contributed to this response.

We acknowledge your unanimous opposition to the Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point. As stated in the cover letter,

> *After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time....Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.*

To respond to the specific comments in your letter:

Comment: *The hazardous conditions of transporting liquid fuel on our highways; one fuel spill and it becomes a "worst case" condition that will affect our health.*

Response: An accidental spill of the entire contents of a 55-gallon container of hydrazine along the highway could have a significant health effect if not remediated immediately. The safety hazards of transporting fuel to the site, as well as possible mitigating measures are disclosed in Volumes I, VI and VIII of the dEIS. Although the consequences of one spill that is not remediated immediately could be significant, the risk of such an accident occurring is minimal for the following reasons:

* Transportation of liquid propellant chemicals is regulated by the U.S. Department of Transportation and hazardous drums and cylinders must conform to DOT specifications. 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to puncture because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials. As stated in the dEIS (Appendix VIA), *"...the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."*

* Accident rates along the transportation route were based on accident statistics for each road segment evaluated for all vehicle types, which is likely to be an overestimate of the truck accident rate. *"Historically trucks carrying hazardous materials have a lower accident rate than that for other vehicles (DEIS Volume I, page 5-39)."*

* The trucks or vans carrying toxic fuel will be accompanied by a HAZMAT team. As stated by Risk Science Associates (Appendix VIIIA), *"It is assumed that within this 15-minute blanketing time, the HAZMAT team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it."*

12-262

Comment: *Jobs for this project are of those of highly and technically skilled nature and it will be for only those who are educated and trained with experience that would be employed.*

Response: A major benefit of a commercial rocket launching facility would be increased job opportunities on the Big Island. As discussed in Appendix IXA, Executive Summary (pp. ES-2 through ES-5, 4-1 through 4-9, 5-1 and 5-2), the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka'u.

The estimated 290 jobs for the local labor force in Ka'u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the aerospace industry for most of these workers range from $25,000 to $45,000. Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In addition, a firm commitment to on-the-job training by the Consortium and the various launch companies is provided for in the State Spaceport Management Plan (Appendix XE) and would be an expectation of the Authority which would negotiate the operating and site development agreements with the launch companies that comprise the Consortium. It is likely that this commitment would be obtained without difficulty, since it would be in the best interests of the companies to hire locally (Appendix IXA, pp. 4-11 and 4-12). Local hires offer advantages in that they are available immediately, do not require relocation funds, and the risk of their leaving their jobs is lower than it is for mainland hires. Specific job-training programs, however, would be developed after the job requirements are defined by the companies which would actually be participating in spaceport, and when the available labor force can be assessed and specific training needs identified.

Comment: *It will affect the endangered green sea turtles (Figure III-2.7) at Nahuluhulu Point, Kamehame and Makuka Bay.*

Response: Federally listed endangered green sea turtles (*Chelonia mydas*) and Hawksbill turtles (*Eretmochelys imbricata*) have been reported in the vicinity of Palima Point (DEIS Volume III, Appendix E). The area around Palima Point offers foraging for both turtle species. Green sea turtles migrate to French Frigate Shoals to breed, while hawksbills nest mainly on beaches in the main Hawaiian Islands and have been found nesting at Kamehame Hill, Punalu'u Bay and Ninole Cove and at Apua Point and Halape in Hawaii Volcanoes National Park (NOAA 1992). Based on recent surveys of the Palima Point area, the majority of sea turtles observed in the area are green sea

turtles. In an inventory of the area, Brock & Kam (1990) only observed green sea turtles, and in surveys conducted since 1976, no hawksbills were captured at Punalu`u, although immature hawksbills were observed outside of the bay. Brock & Kam (1990), however, did find evidence of hawksbill nests at Kamehame Hill.

Green sea turtles on the main islands of the Hawaiian chain do not bask on land, they only rest underwater on subtidal ledges where they have been known to stay submerged for two and half hours. Of the two species inhabiting the area, therefore, only female hawksbills leave the ocean to come ashore when they lay their eggs in nests on the beach (copulation takes place in the water).

As stated in Volume VIII, Appendix B of the dEIS, the main route of exposure to foraging sea turtles would be through inhalation of contaminants in the air (even if there were contaminants in the water it is very unlikely that they would be absorbed through the leathery skin of the turtles). Because toxic releases from rocket launches are of short duration, the actual dose of contaminant that a turtle would receive would probably be minimal. For example, a turtle resting underwater would have no exposure at all. If a turtle is at the surface when toxic fumes are released, the exposure would be intermittent. This is because turtles have a variable breathing pattern which consists of a period of apnea followed by several closely spaced breaths. Other activities at the site, such as light pollution and human disturbance, could potentially have a higher negative impact on turtles than the release of toxins into the atmosphere. These potential impacts can be mitigated by a lighting plan (such as in place at Cape Canaveral) and management of human activities near nesting sites such as proposed in the Shoreline Access Management Plan.

Hawksbills would probably have the highest exposure to contaminants released by spaceport activities because they are the only sea turtles which come on land in the Palima Point area. Hawksbill females laying eggs or nestlings leaving the nest could inhale contaminants released during launch activities. Incubating eggs could also be exposed to contaminants in soils if contaminants from a spill were to reach the beach at Kamehame Hill. Considering the distance of Kamehame Hill from the launch pads and the propellant storage area, it is improbable that a spill would reach the beach. It is more likely that wet deposition of atmospheric contaminants could contaminate sand, thus exposing eggs and nestlings.

There is no available eco-toxicological data on the potential effects of exposure to contaminants that may be released from the spaceport to hawksbills, therefore, it is unknown what the impact may be, if any, to nesting turtles. In the absence of toxicological data, however, the most effective mitigation measure for nesting hawksbills would be to establish a sea turtle nesting preserve in the area surrounding Kamehame Hill. This area could be routinely monitored for the presence of contaminants in the air and soil after launches as part of a Mitigation Monitoring Program.

In developing a Mitigation and Monitoring Program, care must be taken to establish the natural background levels and acidity and compensate for acid and other deposition due to volcanic eruptions. It should be noted that the deposition of acidic substances from a launch is extremely small when compared to releases and deposition from the

volcano. It must also be noted that historic exposure of turtles to these volcanic gases dwarfs any future exposure from rocket launches. It is extremely doubtful that acid emissions from launches would have an impact on turtles in the area unless there was a "direct hit" of a fragment from a destroyed rocket on Hawksbill turtle breeding grounds. Nevertheless, a monitoring program may be useful to allay fears and serve as an early warning system.

A similar analysis can be made concerning organic emissions of hydrazine, UDMH, and other toxic chemicals. While the toxicological data base is unfortunately inadequate in regards to eco-toxic effects, if turtles are no more sensitive to the chemicals in question than the animal species tested as described in the literature (or humans, for that matter), it is doubtful that emissions under normal or accident scenarios would have a significant impact on turtles.

It is also unlikely that the turtles could be impacted via their food supply because the substances emitted are not bioaccumulated or concentrated in the food chain.

Comment: *It will also affect the Hawaiian hawksbill bird (pg. 3-41, (Figure III-2.10) the anchialine pool; and other endangered species.*

Response: As shown on Figure III-2.10, only one endangered species was found on site during field survey conducted in late-summer 1990 (Freed, Appendix IIID)--the Hawaiian hawk (*Buteo soliarius*). In addition, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was observed in the Punalu`u area, south of the Population Control Zone (PCZ).

As stated in Chapter Four of the dEIS, noise from construction might cause Hawaiian Hawks to forage further from the source of noise than they might otherwise forage, but these birds have substantial home ranges and it is unlikely that a temporary shift in foraging locations by a few individuals will affect either their survival or reproductive success. It is possible the birds may grow accustomed to the noise, as has been documented for many diverse species of birds elsewhere in the country. The Hawaiian Hoary Bat, which roosts during the day, may avoid areas where noise is the greatest. When the Spaceport is operational the Hawaiian Hawk and Hawaiian Hoary Bat may avoid areas where noise is the greatest, but these noisy areas are probably rarely, if ever, used by these species. The presence of the bat in Pahala indicates that it tolerates some amount of noise and people.

The impacts of facility lighting are likely to vary among the species involved. Additional light would probably be beneficial for the Hawaiian Hoary Bat because lights attract the insects that bats eat. Bright lights might cause any Hawaiian Hawk that might be roosting and nesting in the project area to locate away from the light source.

Endangered and threatened seabirds are more likely to be affected by lights. Seabirds are known to be attracted and disoriented by lights, causing them to collide into buildings.

Construction of roads and buildings may damage cave arthropod habitats. A few Hawaiian Hawks might increase their foraging area to avoid buildings. There is a possibility that seabirds could collide with a building, fence, or other vertical structure even in the absence of disorientation caused by light.

Strict adherence to the Hawaii County Lighting Ordinance, which requires shielding of lights in the project area, may prevent attraction of endangered or threatened seabirds and thus reduce the probability of collision. Roads and buildings could be sited so as to avoid potential habitats. Chance collisions are by definition impossible to control and depend on the flight path of the birds. If an actual project is proposed, the U. S. Fish and Wildlife Service will be contacted for advice on siting facilities to minimize the number of potential collisions

It is assumed that any spilled materials would be toxic to biota residing in either the groundwater or the anchialine pool located on the project site. Modeling shows that spills occurring in the launch pad area would not affect the pool. Because it is not located down-gradient from any other likely spill location, the pool would probably not be affected by spills from other launch facility areas.

The toxicity of anthropogenic materials to organisms residing in the groundwater or anchialine pools is essentially unknown; however, statistically significant increases in inorganic fertilizers (from treated sewage and dry fertilizers) on the Kona coast have had no quantitatively definable impact to these biota despite more than seven years of monitoring.

12-264

Comment: *Land use zoning (page 3-24)-over 10,400 acres must be controlled by this project, however, we are concerned that it will affect Ka Lae Point which is Hawaiian Home Lands of 12,000 acres (historical and sacred lands).*

Response: There are no Hawaiian Homelands around Palima Point, the site selected for assessment in the dEIS. The Hawaiian Homelands are situated at Kama`oa-Pu`ue`o in the vicinity of Kahilipali Point which was not under consideration in the EIS. This area is well over 20 miles from Palima Point and thus will not be directly affected by the project. One of the reasons that the Palima Point site was selected over Kahilipali Point as the location of the proposed project was because it was recognized that the Ka Lae lands were historical and sacred lands.

Comment: *Land acquisition and control- the State has not implemented as to whom, when and where they will acquire lands for this project (page 3-24 and page 3-26). Your mention of exchanging lands, leasing lands and the last resort to use eminent domain power of which we interpret as stealing of lands.*

Response: Landowners within the 10,401-acre Population Control Zone at Palima Point include: Bishop Estate, 3,363 A; IASCO, 3,408 A; New Hawaii MACNUT, Inc., 95 A, Ka`u Agribusiness, 1,304 A; Hawaiiana Investment Co., 3 A; and State of Hawaii, 2,228 A. Only about 1,000 to 1,200 will be developed. As stated in Chapter Three and Appendix

IXE of the dEIS, the vast majority of the lands needed for the project, including the PCZ, need not be acquired outright. The State would probably have to obtain easements for the construction of roads and utility lines to service the launch facilities. In addition, during actual rocket launches, the State and/or the operator of the Facility must have the authority to evacuate these areas and restrict access to them until such time as the launches are completed. During other times when launches are not occurring, current land uses which are consistent with the project could be continued. Development in these areas would need to be controlled in order to prevent uses which might be incompatible with the project in the future.

"Less-than-fee" agreements would be preferred for most land within the PCZ, especially those areas (about 9,200 acres) that only serve as buffer zones. Should the State be unable to reach agreements with landowners, it is anticipated that any purchase of land would occur through friendly condemnation at its fair-market value as determined by appraisals and through negotiations (DEIS Appendix IXE).

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services. No action will be taken on land acquisition until an actual project is proposed.

Comment: *Ceded Lands Trust - (page 3-26 and 3-27). "There is a strong possibility that the State-owned lands at the site are ceded lands." We are the beneficiary of these ceded lands and not the State. We oppose the use of our ceded lands for this project.*

Response: As you state, there is a strong possibility that the State-owned lands at the site are ceded lands. The Population Control Zone extending into the ocean would include the submerged lands which are also considered to be ceded lands. The use of ceded public lands on the island of Hawai`i has become an issue of concern by Native Hawaiian beneficiaries of the trust and the inclusion of 2,228 acres within the Population Control Zone is of concern to the Ka`u Hawaiians, the Office of Hawaiian Affairs, and Hawaiian community organizations who advocate for sovereign control over those lands. These interests oppose long-term commitment of the ceded lands before Hawaiians have negotiated settlement of their sovereign claims. Hui Na`auao, a Hawaiian sovereignty education group comprised of 48 different organizations and the Hawaiian Sovereignty Advisory Commission seek a moratorium on the alienation of the ceded lands from the trust until the establishment and recognition of a sovereign Hawaiian entity.

Comment: *You do not address historical sites, burial sites, heiaus, petroglyphs and most of all submerged lands along the coast of Palima. All submerged lands are ceded lands.*

Response: As stated in the dEIS, Chapter Three:

> *A complete (100 percent) archaeological inventory and limited subsurface testing were conducted for the proposed launch pad area (approximately 800 acres) by Cultural Surveys Hawaii (Appendix IV). Additionally, a planning reconnaissance was conducted at the northeast end of the PCZ to determine the relationships between archaeological sites on either side of the HVNP boundary. A total of 138 archaeological sites and site complexes were identified during the survey. Cultural resources are discussed in Chapter Seven, Section I of the dEIS; see CSH, Appendix IV, for the complete survey results and significance evaluations.*

Submerged lands are discussed in the previous response. In addition, it should be noted that no submerged lands will actually be used for the project. Activities that occur on the ocean surface, such as fishing, will have to be curtained for a few hours before and after a launch for safety reasons. As was the case with the establishment of a "safety zone" on ceded lands of Nohili for test rocket launches from the missile base, the Department of Land and Natural Resources would have to grant an easement in order for the Population Control Zone to be established. The granting of a easement would be subject to the Chapter 91 Administrative Procedures Act. Thus, public hearings would be held and the Ka`u community and Hawaiian groups would be afforded an opportunity to register and express their concerns.

Comment: *Ka Lahui Hawai`i requests that you submit a full study on the above that pertains to Hawaiian rights.*

Response: In preparing the Social Impact Assessment, the consultants were following the standard procedures for conducting a State EIS for the Spaceport. Under the federal guidelines, in instances where developments pose a potential impact to native people, particular traditional cultural properties of Native Hawaiians are documented and assessed. In such cases, the EIS is designed in compliance with statutory requirements and policies including the National Environmental Policy Act, the National Historic Preservation Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and other federal legislation pertaining to the protection of cultural resources and Native Hawaiian rights and beliefs.

The consultants realize that statutory policies expressed at the federal level should not preclude an in-depth analysis of development impacts on native people for a State EIS. Information regarding Hawaiian resources in terms of ecological (atmospheric/terrestrial/aquatic) impacts, subsistence impacts, cultural impacts, and spiritual/religious impacts were briefly addressed in the Social Impact Assessment (Appendix IXC) and more work was possible. The limiting factors were the scope and budget which necessitated a broader focus and precluded a sociocultural assessment specific and limited to Hawaiians. Such a study would be undertaken as part of a supplemental EIS process if and when an actual project is proposed.

Kona Hawaiian Civic Club

November 19, 1993

Department of Business, Economic Development and Tourism
Attention: Takeshi Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, HI 96804

Subject: TESTIMONY SUBMITTED FOR THE PALIMA POINT CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY
TMK: 4-6-2:por.01-06;09;10;20;28;42-49; and 9-6-13: por. 03;05;06

Dear Mr. Yoshihara:

The Kona Hawaiian Civic Club strongly opposes the Palima Point Conceptual Plan For a Commercial Satellite Lauching Facility proposed for development in the District of Ka'u, Island of Hawaii.

On October 30, 1993, at the annual Association of Hawaiian Civic Clubs Convention held in Las Vegas, Nevada, a resolution submitted by the Kona Hawaiian Civic Club in regards to this proposed lauching facility was unanimously adopted. The National Association of Hawaiian Civic Clubs encompasses 46 clubs and eight states. The entire plenary session adopted this resolution (enclosed) and it carries the weight of the whole Association who is prepared to defend it.

We respectfully submit the attached resolution as testimony in regards to the proposed plan for a commercial satellite launching facility.

Respectfully yours,

Leimana DaMate

Leimana DaMate, President
Kona Hawaiian Civic Club

cc: H. K. Bruss Keppler, President, National Association of Hawaiian Civic Clubs
Ann Nathaniel, President, HI District Council President, AOHCC

P.O. Box 4098, Kailua-Kona, Hawai'i 96745

Kuia I Ka Nuu

12-268

RESOLUTION NO. 93-32

URGING THE CESSATION OF ALL SPACEPORT DEVELOPMENT ON HAWAI'I ISLAND

WHEREAS, the State, through its Department of Business, Economic Development & Tourism (DBEDT) and the Office of Space Industry, has expended in excess of seven million dollars to promote and develop a spaceport in the Ka'u district on Hawai'i island, and has produced a Draft Environmental Impact Statement (DEIS) for said development; and

WHEREAS, this DEIS outlines fifteen significant unresolved issues and describes numerous sociocultural impacts, including but not limited to unspecified social changes, establishment of a 10,400-acre population control zone, and public use restrictions on large areas of ceded 5(f) trust lands, both onshore and offshore; and

WHEREAS, the preferred site at Palima Point is adjacent to a major fault zone and located in an area that poses the highest risk of hazardous lava innundation and major seismic activity; and

WHEREAS the State, through the Office of State Planning, has said it will seek legislation to discourage development and future growth in high risk areas subject to lava innundation and major earthquakes; and

WHEREAS, ground transportation trips and planned rocket launches will expose island residents to unacceptable health, traffic, and safety hazards, including the potential for loss of life and property, and many of which may cause irreparable damage to the island's natural resources for present and future generations, including contamination of air, land, and water; and

WHEREAS, the State has enacted legislation (Act 172) to prohibit the launch of space vehicles within the territory of the State of Hawai'i that carry weapons of destruction, nuclear waste materials or use radioactive materials as a power source; and

WHEREAS, the State Attorney General believes that such a prohibition could be preempted by federal law and thereby deprive the State and County of authority to approve of and control a space vehicle's payload or fuel source; and

WHEREAS, about 65 percent of people responding to an island-wide survey conducted for the DEIS, including the majority of respondents to polls conducted by Senator Andy Levin, and Representatives Jerry Chang and Virginia Isbell, were opposed to the development of a spaceport on Hawai'i island; and

WHEREAS, the Preamble of the Constitution of the State of Hawai'i affirms that the people reserve the right to control their destiny, to nurture their integrity and culture, and to preserve the quality of life they desire; and

WHEREAS, Article IX, Section 8 of this Constitution empowers the State to promote and maintain a healthful environment, including the prevention of any excessive demands upon it and the State's resources; and

WHEREAS, Article XI, Section 1 of this Constitution mandates that, for the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawai'i's natural beauty and all natural resources and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of self-sufficiency of the State; and

WHEREAS, Article XI, Section 9 of this constitution provides, in part, that each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources;

WHEREAS, it is clear that space exploration and defense spending have been de-emphasized and reduced by the Federal government;

NOW THEREFORE BE IT RESOLVED by the Association of Hawaiian Civic Clubs in Convention at Las Vegas, Nevada, this 30th day of October, 1993, that the Hawai'i State Government, and DBEDT in particular, be urged to take immediate action to (1) discontinue all plans to promote and develop a spaceport on Hawai'i island, (2) prohibit any additional expenditures of public funds toward such a development, and (2) close the Office of Space Industry; and

BE IT FURTHER RESOLVED that certified copies of this resolution be transmitted to Governor John D. Waihee III, Senate President James Aki, House Speaker Joe Souki, Mufi Hannemann, Director, DBEDT, Senator Andy Levin, Representatives Virginia Isbell and Jerry Chang, Mayor Stephen K. Yamashiro and Kalani S. Schutte, Chairman, Hawaii County Council.

SUBMITTED BY: Kona Hawaiian Civic Club
REFERRED TO: Employment & Housing Committee
ACTION: ADOPTED AS AMENDED

12-269

JOHN W.
GOVE
JEANNE K. SCH
DIRE
RICK EC
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

Ms. Leimana DaMate
President
Kona Hawaiian Civic Club
P.O. Box 4098
Kailua-Kona, HI 96745

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. DaMate:

We acknowledge receipt of the Hawaii County resolution. Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

THE PELE DEFENSE FUND
POST OFFICE BOX 404 • VOLCANO, HAWAII 96785
PHONE: (808) 936-1883 • FAX: (808) 936-3551

POSTED

RECE

'93 NOV 22 P2:01

Comment of Pele Defense Fund
re: DBEDT Draft EIS on
Conceptual Plan of Satellite Launch Facility

We feel that the wide range of impacts on the sensitive native ecosystem of the Ka'u coastline, and on native Hawaiians who continue traditional native lifestyle in Ka'u, which would result from carrying out this "Conceptual Plan" are either not understood or purposely ignored in this Draft E.I.S.

Perhaps the fact that this is only a State document, and not a joint State-Federal E.I.S. accounts for its failure to address certain impacts to native Hawaiian rights which we feel are guaranteed in federal law under the 1st amendment of the US Constitution, the American Indian Religious Freedom Act, the Native American Grave Repatriation and Protection Act, the National Historic Preservation Act, the National Environmental Protection Act, and the Coastal Zone Management legislation. However, there would seem to be no excuse for the failure to address issues which arise from consideration of the State's responsibilities to native Hawaiians and the environment under the Admissions Act, the State Constitution (e.g. Art. XII, sec. 7), cultural sites and burials protection law, the Hawaii Environmental Protection Act, and the ceded lands trust.

Having seen the attempt by the federal Dept. of Energy to outline an ethnographic study of the impacts of geothermal development on native Hawaiians, we can only find the State DBEDT Draft E.I.S. inadequate and unacceptable. We ask Governor Waihee to reject this document.

With lifelong commitment,

Palikapu Dedman

Pele Defense Fund
Palikapu Dedman, President

PDF:mmc

c: Kenneth Munechika, DBEDT

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM
Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

JOHN WA
GOVE
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DEPUTY DIRE
TAKESHI YOSHIH
DEPUTY DIRE

SEP. 30 1994

Mr. Palikapu Dedman
President
The Pele Defense Fund
P.O. Box 404
Volcano, HI 96785

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Dedman:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Jon K. Matsuoka, Ph.D. and Davianna McGregor, Ph.D. contributed to this response.

Comment: *We feel that the wide range of impacts on the sensitive native ecosystem of the Ka`u coastline and on native Hawaiians who continue traditional native lifestyle in Ka`u which would result from carrying out this "Conceptual Plan" are either not understood or purposely ignored in this Draft E.I.S.*

Response: Impacts on native ecosystems are addressed in several volumes of the dEIS. Please see Volume I, Chapters Three, Four and Five; Volume II, Chapter Seven; Volume III, Appendices C, D & E; Volume IV (Archaeological Resources); Volume VIII, Appendix B; and Volume IX, Appendices B, C & D.

The Sociocultural Impact Assessment (SIA) authored by Jon K. Matsuoka, Ph.D. and Davianna McGregor, Ph.D. (Appendix IXC) was completed in December of 1992. A major finding relates to the traditional and historical significance of Ka`u. The persistence of Hawaiian cultural customs, beliefs, and practices among Ka`u Hawaiians, and the existence of extensive complexes of historic sites make Ka`u a district of prominence for the perpetuation of Hawaiian culture. Hawaiians throughout the islands recognize the district as an important stronghold for Hawaiian culture.

A commercial satellite launching facility will impact the rural lifestyle of the Ka`u residents in numerous ways. As mentioned in the SIA, some of the negative sociocultural impacts can be mitigated; but not all of them. Hawaiians in Ka`u are more reliant upon the natural resources for cultural and subsistence purposes than other ethnic groups, and will be more severely impacted by the Spaceport development than other ethnic groups.

Issues pertinent to subsistence were addressed in Volume IX, Appendix D. The coastal areas within the project district in Ka`u were generally described in terms of access, shoreline features, and type of use. Spaceport development impacts were assessed according to how they would affect subsistence and recreation use of the areas. Although Hawaiians were not singled out as a group being affected, the high rates of subsistence among Hawaiians suggests that they would be the most severely impacted group among Ka`u residents.

Short-term development effects included soil erosion and sediment run-off into nearshore waters, noise from construction, and shoreline access; intermittent effects included commercial rocket launching which could pose several dangers for subsistence/recreational users; and long-term effects included hunting restrictions within the population control zone, loss of the wilderness character and traditional camping sites, loss of privacy and surveillance by security, and loss of isolation and seclusion. The cumulative effects were assessed in relation to population growth in the district, about one quarter of which would be attributable to Spaceport development. Population growth and increased pressure on existing ocean resources paired with

declining access to traditional areas would have adverse effects on subsistence and recreation.

Comment: *Perhaps the fact that this is only a State document and not a joint State-Federal EIS accounts for its failure to address certain impacts to native Hawaiian rights, etc....Having seen the attempt by the federal Department of Energy to outline an ethnographic study of the impacts of geothermal development on native Hawaiians, we can only find the State DBEDT Draft E.I.S. in adequate and unacceptable.*

Response: The design of the sociocultural impact assessment was based on an attempt to assess potential impacts of Spaceport development on the general Ka`u population. The heterogeneous composition of residents of Ka`u necessitated the acquisition of a representative sample of respondents. This would ensure that different perspectives would be assessed in order to determine how various groups would be affected by the development. Strong efforts were made to include a representative number of Hawaiians in the sample. Information was gathered from organizations and individuals representing Hawaiian perspectives and backgrounds (Appendix IXC). The consultants realize, however, that the percent of Hawaiians in the sample was less than the resident population as reported in United States Census and Health Surveillance data.

The attitudes of Hawaiians were consistent with those of the general sample or population. The SIA found that a majority of respondents were opposed to Spaceport development; preferred community-based economic activity such as diversified agriculture, small business, and fishing (Appendix IXC, Table VII); believed that existing qualities such as rural lifestyle, Hawaiian customs, and subsistence were vital to the district (Appendix IXC, Table IX); and wanted to preserve existing lifestyle, open space and shoreline, historic and archeological sites, and fishing and gathering grounds (Appendix IXC, Table XIV).

Subgroup comparisons by ethnicity indicated that Hawaiians expressed the strongest opposition to the Spaceport which was viewed as a threat to ecosystems that were essential to subsistence, a threat to historic and archeological sites, and might preclude native Hawaiians from settling on lands under the Department of Hawaiian Homelands.

Native Hawaiians were also viewed by human service professionals as a "high risk" group for social and mental health problems. High rates of these problems were attributed to modernization that transformed traditional living patterns and culture-conflict that contributed to stress. The Spaceport was viewed by many as a means of perpetuating the types of social and economic changes that had predisposed Hawaiians to the problems already existing.

With regard to the idea of conducting a Native Hawaiian ethnographic survey comparable to that being undertaken for the Hawai`i Geothermal Project, the consultants were following the standard procedures for conducting a State EIS for the Spaceport. Under the federal guidelines, in instances where developments pose a potential impact to

native people, particular traditional cultural properties of Native Hawaiians are documented and assessed. In such cases, the EIS is designed in compliance with statutory requirements and policies including the National Environmental Policy Act, the National Historic Preservation Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and other federal legislation pertaining to the protection of cultural resources and Native Hawaiian rights and beliefs.

The consultants realize that statutory policies expressed at the federal level should not preclude an in-depth analysis of development impacts on native people for a State EIS. Information regarding Hawaiian resources in terms of ecological (atmospheric/terrestrial/aquatic) impacts, subsistence impacts, cultural impacts, and spiritual/religious impacts were briefly addressed and more work was possible. The limiting factors were the scope and budget which necessitated a broader focus and precluded a sociocultural assessment specific and limited to Hawaiians.

As stated in the cover letter:

> *"After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement--which would be the responsibility of the private developer--and various licenses, permits and agreements with State, County and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services."*

If an actual project is proposed, the concerns that you express in your letter would be addressed more thoroughly in a supplemental EIS.

Comments on the Draft EIS
For the Proposed Spaceport

Ruth Marie Bass P.O. Box 690 Naalehu, Hi 96772
November 12, 1993

The draft Environmental Impact Statement (dEIS) gives us enough additional information on the hazards of the rocket launching industry to know that we absolutely do not want the facility located on this island of Hawaii. The Office of Space Industry (OSI) has concealed pertinent economic and financial feasibility studies from the public and legislature. One such document paid for by the Hawaii state taxpayers, at a cost of $650,000, was completed by CH2M Hill in 1990. (CH2M Hill was the original consultant contracted to complete the draft EIS and the Final EIS for the spaceport. However, they were fired after the completion of the Master Plan.) The Master Plan for the proposed spaceport was more than just a conceptual design and layout of the facility. According to the "Scope of Work in Preparing the Master Plan" document, the consultant was also assigned to survey the world-wide payload community, identify which payloads could be launched on which rockets, determine costs to launch the payloads, analyze world commercial launch capabilities, investigate the need for a Hawaii-based launch complex, identify anticipated expenditures in the development, operation, and maintenance of the proposed launch complex, conduct a cost/revenue analysis and to produce a financial feasibility report. DBEDT and OSI have refused to release the document in spite of several UIPA (Uniform Information Practices Act) requests from citizens, legislators, and the media. What are they hiding and why? Millions of additional dollars have been spent on this project after the completion of this report, though the spaceport development is not a financially or economically feasible project. To continue to spend money on this project is a blantant waste of taxpayers' hard earn cash which is currently needed for schools, infrastructure, health care and social services for the disadvantaged. THE STATE SHOULD NOT FUND AND COMPLETE THE FINAL EIS FOR THE PROPOSED SPACEPORT. If there are interested private developers, let them pick up the costs of any additional studies, land acquisition, etc.

The Attorney General's office should investigate Office of Space Industry and DBEDT for "misapplication of entrusted property" by spending millions on a project that is obviously financially foolish. The AG should investigate the OSI's assignment of the draft EIS contract to MCM Planning without accepting competitive bids and investigate the Hawaii Space Development Authority, a Governor appointed advisory committee, for violation of the state's "Sunshine Law" with its closed meetings and failure to maintain agendas and minutes of the meetings.

12-273

The Hawaii proposed spaceport is the laughing-stock of the entire aerospace industry, especially for those with whom I spoke from Vandenberg. It's time the legislature realized that and drop this useless, wasteful project. No developer has shown up to take on the project and none will.

To complete the draft EIS process I am submitting these and additional comments and questions in the following pages:

JOBS: According to the Draft EIS, at full operation the spaceport is expected to employ 270 people, of which 150 will be transient workers; scientists, engineers, and technicians from outside Hawaii. The estimate of 120 direct jobs available to local residents will be non-specialist labor. (Vol. II 6-7, 6-10) Should 120,000 residents of the Big Island be expected to live with the inherent hazards and risks of this industry which offers only 120 jobs. One example of the jobs available to the local people is the HAZMAT team. HAZMAT means hazardous material. The HAZMAT team will follow behind the transportation trucks carrying the potentially explosive rocket motors and the liquid propellants. The team's job is to clean up any toxic spills of these carcinogenic, and sometimes mutagenic and teratogenic substances. Mutagens cause genetic mutations; teratogens cause gross abnormalities in developing fetuses. Teratology is the study of monsters, so you can imagine what teratogens create. Thalidomide is a teratogen. The dEIS has also suggested that our County personnel as well as National Park personnel would be ready and willing to assist with the clean-up of these toxic substances.(PAGE 12 for more details) I suggest that their Unions be consulted before committing these people to such clean-up projects.

What is the number of workmen's-comp claims associated with the launching industry over the last thirty years? What is the cost of workmen's compensation insurance for the launch related industries compared with other industries? What are the case names associated with launch industry accidents and what is the amount of each settlement for the last thirty years in this country?

STATE AND COUNTY REVENUES: "At project completion, revenues to the County are expected to exceed expenditures by $3.7 million per year....State revenues are expected to exceed expenditures by about $4 million per year. The resulting combined fiscal impact on the County and State is that revenues are expected to exceed expenditures by an estimated $7.7 million per year." (Vol II, 6-24),Decision Analysts Hawaii, Inc. Appendix IXA

JOBS WITHOUT SPACEPORT: "Without the Spaceport, employment in Kau is projected to increase from 1,500 jobs in 1990 to about 2,100 jobs in 2005, an increase of 600 jobs." (6-15)

(9-2) According to the dEIS the construction jobs and the indirect jobs associated with the launch facility "could be created by any large construction project on the Island." Also, when considering the annual $4 million to the State and the $3.7 million to the County, the dEIS notes, "other types of development could have similar economic impacts on State and County governments."

(9-3) The dEIS goes on to say, "If the launch facility is not developed, the risk of exposure to toxic chemicals would be eliminated or greatly reduced, as would the potential for property damage from accidents due to launch-related activities."

MARKET ANALYSIS/FINANCIAL FEASIBILITY REPORT: Blantantly missing from the dEIS is a Market Analysis and Financial Feasibility Report on the launching industry. However, that information is found in the Master Plan that was completed by CH2M Hill, the original EIS consultant. The Office of Space Industry has refused to release that document for public and legislative review. The Financial Feasibility Report was dated February 1990. Only one month later, in March of 1990, the Office of Space Industry intimated to CH2M Hill that it was considering terminating its contract with the consultant. The following excerpt if from correspondence dated March 20, 1990 states, "...the work products produced by CH2M Hill,...,will become the property of the Department and must be surrendered to the Department in the event that the consulting agreement of December 1, 1988,...,is terminated by either of the two parties for any cause." By the end of that summer the State terminated its contract with CH2M Hill.

A year later, on August 14, 1991, in a public meeting sponsored by DBEDT director Murray Towill, the director of OSI denied that a market analysis or financial feasibility report had ever been conducted for the state. The Financial Feasibility report stayed effectively buried until a UIPA request for correspondence between CH2M Hill and OSI revealed its existence.

In a Kau Spaceport Advisory Board meeting, I asked Admiral Hayward about the Financial Feasibility Report completed by CH2M Hill. He told us that he didn't really like the report, that he felt that the consultant didn't consider enough of the possibilities. I asked if that was why CH2M Hill was fired, and he dodged answering that question, by saying, "What makes you think they were fired?" I asked if the Governor had seen the Financial Feasibility Report, and Admiral Hayward said that he

didn't know. He was the advisor to the Governor and he didn't know if the Governor read the report.

Currently, the Financial Feasibility report is withheld from the public by being termed a pre-decisional draft document, which exempts it from the State's freedom of information act, otherwise known as UIPA (Uniform Information Practices Act).

MASTER PLAN: The Master Plan was completed by CH2M Hill in 1990 and costed taxpayers $650,000. Now OSI says it will not use the document and that a new Master Plan "will be drawn up once there is a project." (Conceptual Plan, Feb. 1993, p.2)

OSI lead us to believe that the Master Plan was just a conceptual plan to design the layout of the launch facility. But correspondence between CH2M Hill and OSI indicates that it included complete financial analysis of the proposed Hawaii launch industry.

SCOPE OF WORK FOR THE MASTER PLAN: According to the Scope of Work in preparing for the Master Plan document to be completed by CH2M Hill, the consultant was to "Identify Potential Market Types" :

1. By surveying the world-wide payload community and determining which payload types could realistically be launched from the facility.
2. By identifying the basic payload launch characteristics/requirements for payloads.
3. By analyzing which payloads could be launched by which rockets.
4. By determining the costs to launch the payloads by evaluating current launch operation costs at existing facilities and at planned facilities.
5. By analyzing the existing world commercial launch capabilities for the launch vehicles to provide an estimate of existing and planned launch capabilities from 1993 to 2003.
6. By using the commercial payload launch costs to project annual revenues onto a plausible launch schedule.

The Master Plan also was to "Conduct Cost/Revenue Analysis":

1. By continuing to investigate the need for a Hawaii-based launch complex by comparing the projected market demand for commercial launch services with both foreign and domestic capabilities of existing and planned commercial launch facilities.
2. By identifying the range of anticipated expenditures to be incurred in developing the Hawaii launch complex.
3. By identifying the range of anticipated expenditures to be incurred in the operation and maintenance of the proposed launch complex.

The Master Plan was to produce a "Financial Feasibility" report:

1. To estimate the Net Income to be generated by comparing projected income from proposed payload launches with anticipated development and operational expenditures.
2. To conduct a cash flow analysis over a 10-year period assuming 100 per cent capital financing.

And finally, the draft Master Plan was to include an analysis of the potential commercial payload markets to be served by the Hawaii launch complex, as well as a breakdown of anticipated costs and revenues.

This document has been withheld from the Legislature and the public, though it was completed in 1990. For 3 and one-half years, OSI has known that the project was not financially feasible, yet the Office continued to spend millions more dollars. Admiral Hayward continued to rake in his high dollar salary and lavish expense account as documented in Pat Tummon's Environment Hawaii, July issue. The criminal acts of miapplication of entrusted property HRS 708-874 by those operating the Office of Space Industry are likely to be ignored by the state's attorney general's office as were so many other OSI violations such as the assigning of the new EIS contract without competitive bids, or the use of the name "Hawaii Space Development Authority" when it was not an authority established by the legislature, but only an advisory committee violating Hawaii's Sunshine laws in its failure to reveal minutes and agendas of its closed meetings.

Needless to say, my Jane Q. Public request for the Master Plan and the Financial Feasibility Report were denied by Office of Space Industry.

OSI FINANCIAL FEASIBILITY STUDIES DBEDT director, Mufi Hanneman and OSI's Ken Munechicka quickly drafted a document they called, "Financial Feasibility Studies Related to the Proposed Hawaii Saceport" to satisfy public demand for an explanation of the economic basis used in dEIS. It states, "The satellite launch market is difficult to assess...Due to these uncertainities, DBEDT has not based its spaceport feasibilities studies solely on market analysis." Instead OSI choose three different launch rates for its analysis: 15, 18, 22 orbital launches a year, in spite of a study last year by the Vice President's Space Policy Advisory Board said that foreign competition would leave only 8 to 10 commercial launches annually in the U.S over the next 20 years. But let's look at OSI's most optimistic analysis of 22 launches per year. At the bottom line of the best scenario of the Free Cash Flow Analysis, we see that the first four years produce a Total Financial Flow of a loss of $84.87 million dollars (the Draft EIS said the development costs of the spaceport would be

$420 million, not $84.87 million), the following 11 years produce a Total Financial Flow of $45.94 million on the plus side, leaving the Project in the hole a total of $38.93 million at the end of a 15-year period.(Based on draft EIS, the operation would still be in the hole $374 million at the end of 15 years.) At the continued projected rate, the launch facility is expected to break even in 24.33 years. (Based on Draft EIS development costs, the operation would have to have a full 105 years of 22 orbital launches annually to break even). This does not consider the facts found in the Vice-President's report that only 8 to 10 commercial launches would be available annually for the next 20 years, nor does it consider events of accidents causing property damage or personal injury leading to the law suits, that drive up insurance costs. It does not include the performance expectancy of the launch vehicles. Based on the history of the Atlas, one in eight has blown up, and for the Deltas, one in 17 has blown up. Over the 24 plus years of operations needed to break even (according to Munechika's and Hanneman's models), we can expect 12 Atlas and 5 Delta rockets to blow up. (Over the 105 years needed based on the Draft EIS development costs, we can expect 50 Atlas and 22 Delta rockets to blow up.)

INSURANCE: According to the dEIS, all activities within the Population Control Zone (PCZ)would be covered by an umbrella insurance policy covering the Consortium, the Companies, the Users, all sub-contractors, and the State. However for lawsuits that affect the Spaceport such as fires or other natural disasters outside the PCZ, the State will be self-insured, thus enormous amounts of tax dollars could absorbed by litigation and settlements. The Office of Commercial Space Transportation requires that at least a minimum amount of third-party liability insurance be obtained. If the OCST was required to pay for those insurance costs itself, it wouldn't be so happy go lucky about passing out licenses to new launch facilities with only 2.9 mile PCZ. The other big question is who will insure this $420 million facility, its rockets and the Users expensive payloads, when the project has been located in the highest risk zone for lava inundation. (In fact, the dEIS states that it is very likely that the facility would be covered by lava within the first 50 years of operation.) Homeowners on the Big Island can hardly find companies to insure their houses. Who will insure this project. Will the state be the self-insured entity covering the losses at the facility in the event of earthquake and lava inundation? Will the state pay for personal injury and property damage from a chemical accident that was triggered by a natural disaster? Will the state pay the costs for a "mindless act of terrorism" that happens outside the facility?

INFRASTRUCTURE COSTS: "The State will be responsible for most off-site infrastucture in support of Spaceport...For the State,

the estimated cost of highway improvements, school improvements, and other support facilities totals $ 8 million. Assuming a 6.5%, 20-year bond, the debt service on this amount will be about $700,000 per year." That totals $14,405,000 for the over-all infrastructure costs. If the Thiokol Castor 120 rocket motor, weighing in at 60 tons is to be used an additional $5 million plus finance expenses would be needed for additional bridge improvements. It should be noted that the GEM rocket motors for Delta rockets weigh 14 tons.(Appendix IXA, 8-5&6) Decision Analysts Hawaii, Inc.

LAND ACQUISITION PACKAGE: The Office of Space Industry hopes to use the dEIS as the basis to seek legislative funding for the land acquisition package at Palima Point. 10,400 acres are needed for the entire project. 1200 are needed for the launch complex. What is this projected cost to the taxpayers? Well, how much does land go for on the Big Island; Is it $100 per acre? That would only cost the state $1,040,000. The land is assessed at more than $1,000 per acre. Then that would cost the state $10,400,000. And is it fair to assume that the ocean front property is worth more? Possibly $10,000 per acre? Even with the use of eminent domain, the state must pay fair market value. Or the state can choose to seize land rights by imposing covenants, restrictions and conditions on the land owners, thereby effectively depreciating the current land value.

CEDED LANDS: According to the dEIS, upon annexation to the United States in 1898, the Republic of Hawaii ceded approximately 1.75 million acres of Government and Crown lands to the United States. Government lands were those lands set aside by Kamehameha III for the benefit of the chiefs and people. Crown lands were those lands personally reserved by Kamehameha III. In 1959, title to the majority of these lands was transfered back to the State under Section 5 of the Admissions Act, to be held in a public trust for specifically identified purposes. In 1978, the State Constitution was amended to specify that the ceded lands were to be held by the State in a public trust for Native Hawaiians and the general public and to create the Office of Hawaiian Affairs (OHA) which was given responsibility for management of the public trust fund covering ceded lands. The State-owned lands at the Palima Point site are ceded lands. OHA is now drafting a response on this dEIS. OHA Trustee Moani Akaka asks, "Where OHA's and the general public access to address the dispensation of ceded lands?" Truth is the Native Hawaiians on the Big Island have had enough of being shut out of the state's decision making processes. The dEIS has also suggested using a land exchange to meet its needs.

HAWAII SPACE DEVELOPMENT AUTHORITY: The dEIS recommended establishing an authority by the legislature to assist in acquiring the land at Palima Point. DLNR has the authority to

use eminent domain for lands that are for public use, only. The Spaceport is suppose to be a commercial, and not a government subsidized facility, thus the HSDA would need to be created to use eminent domain in acquiring the land needed for the launch facility. In 1991 the OSI drafted H.B. 900/ S.B. 1391 to establish the HSDA. The bill gives the authority power "to acquire land by power of eminent domain, real, personal, or mixed property or any interest therein for a project of space development district." (SS2h) If for any reason, the OCST requires a larger Population Control Zone before it will license the facility, then it is possible that homes in Pahala would be subject to the State's use of eminent domain. Also under SS 9a the HSDA is authorized to develop on behalf of the State, or may authorize a qualified person to develop the Spaceport in the space development district "...which shall be exempt from all statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, zoning, construction standards for subdivisions, development and improvement of land and the construction of the facilities thereon;"

And what about all the revenues such a project is suppose to bring to the state, an estimated $4 million to the state, and $3.7 million to the County? All this wonderful revenue was to provide for better schools, infrastructure, social and public health services. Not necessarily so with this HSDA bill. SS 10a which states, "All revenues and receipts derived by the authority from any project or under a project agreement pertaining thereto shall be exempt from all state and county taxation."

First OSI tells the taxpayers that a private developer will build the faciltiy, yet OSI created a bill authorizing HSDA to develop the facility on behalf of the state, and then exempted the revenues derived from HSDA from state and county taxation, as well as exempted activities in the space development district from some state and county laws.

LOCKHEED: On Tuesday (Oct. 26, 1993) the Governor's office announced that Lockheed was pulling out of the Spaceport project. Lockheed is the nation's top SDI contractor. And the state has long recognized the SDI market niche for the proposed Spaceport in Kau. So having Lockheed appear to be on board gave some credibility to the Project. Not that DBEDT and Lockheed had agreed to anything significant anyway. DBEDT and Lockheed exchanged letters of agreement in May of this year. That was it, just letters of agreement. DBEDT agreed to continue with the EIS process and to help Lockheed to seek Defense Conversion grants, and Lockheed agreed to perform technical and financial studies and seek Defense Conversion grants. I suppose the state of Hawaii is in the position to assit Lockheed since our own Senator Inouye chairs the Defense Subcommittee of the Senate Appropriations Committee.

So with the exchange of letters of agreement, Lockheed lent its name to the project. Afterall, Admiral Hayward was one of their paid consultants. However, corporations are taken seriously by their stockholders. How many stockholders would invest $420 million in a construction project to be located in the highest risk lava inundation zone on the island? You see real business has a bottom line. The state of Hawaii does not have a bottom line. When it runs out of money, it just goes back to the public and raises taxes. Why did Lockheed pull-out? Well, they never were really IN, anyway, except for the 29 cent stamp they put on that exchange letter. But, apparently some stockholders thought the company might be headed for a down-hill slide and this recent letter announcing Lockheed pulling out of the Spaceport Project was needed to demonstrate that company executives hadn't actually lost all their reasoning abilities.

FOREIGN COMPETITION: For years launch users have been lobbying Congress for the right to launch commercial payloads on Soviet rockets, which could do so at one tenth the cost of American made rockets. On Jan. 4, 1993, Space Business News reported that Lockheed had formed a joint venture with the Russians to sell Proton launchers worldwide. Acting as the capitalist middleman, Lockeed will market the Proton rockets as multiple satellite launchers. On Sept, 15, 1993, United Press International reported that Lockheed formed a commercial launch company named "Lockheed-Krunichev-Engergia International. "This is Lockheed-Krunichev-Energia International first major launch services agreement and it marks a significant milestone for U.S. and Russian industrial cooperation in space," said Lockheed Chairman Dan Tellep. With our combined capabilities, LKEI can offer satellite manufacturers and other customers reliable cost competive access to space."

Arianespace launches from a facility that is approximately 900 miles closer to the equator than the proposed Kau spaceport and can service virtually any orbit a customer would need. The Arianespace 4 launch vehicle is capable of launching several small satellites in piggy back fashion at a time.

Space Transportation Systems is a new major competitor in the South Pacific. The company has signed a deal with several Russian space firms to build a spaceport in Papua New Guinea on the island of Manus. Satellites could be launched in both polar and equatorial orbits from the site which is approximately 1,000 miles closer to the equator than the Kau site.

DOMESTIC LAUNCH FACILITIES: For years commercial satellites have been launched from the existing mainland facilities. With the projected improvements made to the facilities how can Hawaii expect to compete? With the added costs of transporting rockets as well as the sensitive and expensive payloads to the Big

Island, who could possibly think of signing on as a facility user? On Sept. 28, 1993 the Honolulu Star-Bulletin reported that Rep. John Conyers, D-Mich., chairman of the House Government Affairs Committee, wanted to close the Pacific Missle Range Facility on Kauai, contending that it was no longer needed. The congressman cited a study by the General Accounting Office, which found that tests conducted through a STARS missile launched from Barking Sands could have been done for $1.5 million less at Vandenberg Air Force Base in California.

Because of cuts in DoD, small inefficient and costly launch facilities may have to be eliminated. The existing larger launch facilities will look towards commercial launches to help keep them operating profitably. That is why the U.S. government has shifted towards upgrading existing launch facilities to better accomodate the commercial payloads.

SDI AND HAWAII LEGISLATION: In 1987, the House of Representatives formed a "Spaceport Work Group" to examine the A.D. Little report and recommend legislative action. It states, "There is a potential source of business for niche market launch companies not included in the launch requirement studies: the Department of Defense. NASA's budget of about $7 billion is less than half the Department of Defense's space budget of around $16 billion. What that budget would become and what the resulting launch demand would be if the Strategic Defense Initiative goes forward is stunning. The Department of Defense has already contracted some SDI research launches to a commercial launch firm". SDI is currently being conducted on Kauai and Maui. In April 1988 the Legislature appropriated $1.2 million for the Environmental Impact Statement, with a restriction prohibiting launching of military weapons research, military weapons payloads, the Strategic Defense Initiative, and nuclear payloads. This bill was introduced by then Rep. Andy Levin. This was the Legislature's intent, that the Spaceport be a commercial launch facility. However, the Governor vetoed that bill, and went for the unrestricted EIS funding found in the General Budget. The next legislative session in 1989, now a Senator, Andy Levin introduced SB 805 to restrict launches of military weapons research, military weapons payloads, SDI and nuclear payloads from being launched at the site. After the DBED director testified against the bill, it was shelved. The following year Sen. Levin managed to pass a bill that no longer restricted the launching of SDI, but did restrict launching payloads that were "weapons of destruction, nuclear waste material or use radioactive materials as a power source." It was signed June 19, 1990 as Act 172. Does this Act prevent the launching of rockets which are nuclear powered? Sen. Levin sought the opinion of the Attorney General's office on whether the federal government would be able to launch space vehicles from a State or civilian spaceport located in Hawaii during peacetime, without the consent of the State.

ATTORNEY GENERAL'S OPINION: The Department of the Attorney General stated, "We believe that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, either directly or indirectly, during peacetime or wartime. Such preemption would deprive the State of the authority to approve of a launch vehicle's payload or fuel source.

SDI TODAY 1993: On August 4, 1993 UPI reported that, "Lockheed...has started work as the prime contractor on a $600 million program for a new defensive missile, the Theater High-Altitude Area Defense system (THAAD). According to John Pike, of the Federation of American Scientists, the 1972 Anti-Ballistic Missle Treaty with the former Soviet Union does not allow SDI payloads to be launched outside the U.S. According to the Ballistics Missile Defense Monitor, the Clinton administration has renamed SDI. "The Administration officials have focused the program first on theater missile defense then on U.S. defense. They've asked Congress for $3.8 billion in fiscal year 1994...The Defense Department officially changed the name of the Strategic Defense Initiative Organization to the Ballistic Missile Defense Organization.

BIG ISLAND RESIDENTS: According to a 1990 survey conducted by Senator Andy Levin and Representatives Virginia Isbell and Jerry Chang, the majority of the Big Island residents did not want the Spaceport. The opposition to the Spaceport by district was 76% in Puna, 75% in Kona, 74% in Kau and 57% in Hilo. It has been obvious for quite some time that the Big Island residents will not allow this dangerous industry on this island. The people are angry. They have been shut out altogether in this decision making process. We've said no a thousand times, yet OSI and the Governor presses forward without economic justification to force this project on the Big Island. For the dEIS, I submitted a question regarding the mindless act of terrorism. I did not see that question addressed. All the dEIS mentions is of the explosive conflagration and fire that would occur should a bullet penetrate the casing of a solid rocket motor. The 57 mile stretch of highway from Hilo Harbor to Palima Point could conceal many snipers. If the dEIS consultant thinks a single bullet is the worst case scenario of a mindless act of terrorism, the consultant should watch more T.V. News. It was sad to read about the massive conflagration (explosive non-extinguishable flames), and to think it would be innocent local family men driving the vehicles that follow behind the trucks carrying propellants as the HAZMAT team. That they would be engulfed by those flames is debatable. What is the worst case scenario for a mindless act of terrorism during transportaion of propellants and at the facility? Come now, think of Ireland, Beirut, Somalia, or just watch the news about L.A.

The dEIS states that the economics have changed since those surveys were conducted and that residents may now be interested since resort development hasn't gone as anticipated. The opinions may very well be different today, especially with the release of the long awaited for dEIS. With this document we now learn about the hazardous carcinogenic hypergolic fuels used as rocket propellants. We now know that the microscopic aluminum particles will stay in our lungs and accumulate each time we breathe. We now know that some of the propellants cause cancer, genetic mutations, and gross birth defects. It is very likely that a higher percentage of people on the Big Island now oppose this proposed spaceport.

CONTAMINANTS OF CONCERN: According to the Draft EIS, hypergolic propellants (termed because they ignite spontaneously) include hydrazine, unsymmetrical dimethylhydrazine (UDMH), monomethylhydrazine (MMH), Areozine-50 and nitrogen tetroxide.

Hydrazine is carcinogenic and mutagenic, causing genetic mutations. The Delta rocket uses more than 300 gallons of hydrazine as a blend to form Aerozine-50. Toxic effects of hydrazine involve damage to the lungs, liver, and kidneys, with the liver being the chief site of structural damage. Symptoms include fatty degeneration of the liver, respiratory tract irritation, anemia, anorexia, vomiting and convulsions. The target organs of hydrazine toxicity in humans are the central nervous system, the respiratory system, the skin and the eyes.

Unsymmetical dimethylhydrazine is highly reactive and when heated to decomposition, emits toxic fumes of nitrogen oxides. The Delta rocket used more than 300 gallons of UDMH to form Aerozine-50. A toxic product of UDMH decomposition is dimethylnitrosoamine (DMNA), which has been shown to be teratogenic, causing gross abnormalities in developing fetuses, mutagenic, causing mutations in the genes and carcinogenic. DNMA substances are systemic carcinogens, meaning that they are effective by all routes of administration. These substances are capable of inducing tumors after a single dose. Case reports of acute exposure to high concentrations of this substance have shown liver toxicity, necrosis, and death. This substance has been reported to affect male and female reproductive capacity. Another decay product of UDMH decomposition is formaldehyde dimethylhydrazone. The dEIS assumes that it has equivalent toxicological properties as its parent compound, UDMH. UDMH is hypergolic with oxidants and may ignite when it contacts metal oxides. Materials absorbed with UDMH may cause spontaneous ignition, and the vapors can explode by an electric spark or an open flame. When rockets fuels using UDMH and hydrazine burn the exhaust gases contain trace quantities of unchanged fuel (VOL I, 5-4) UDMH is a carcinogen and the toxic effects due to exposure include respiratory irritation, pulmonary edema, vomiting, convulsions, and hyperglycemia.

Monomethylhydrazine is a volatile caustic liquid which can cause systemic toxicity by absorption through the skin, as well as by inhalation. It is a suspected carcinogen. Exposure can result in central nervous system convulsions, kidney damage, anemia, and hypoglycemia. It is irritating to both the skin and pulmonary tract because of its alkalinity.

Aerozine-50 is a 1:1 blend of hydrazine and unsymmetrical dimethylhydrazine. The Delta rocket uses 615 gallons. A film of A-50 in contact with metal oxides may ignite as a result of the heat of the chemical reaction. Vapors of A-50 can be exploded by an electric spark or by an open flame. It too is a carcinogen.

Nitrogen Tetroxide is a mixture of nitrogen tetroxide and nitrogen dioxide. Reaction of these chemicals with water forms nitrous acid and nitric acid. They are used as oxidizing agents for rocket fuel. The Delta rocket uses 728 gallons of nitrogen tetroxide.It is a highly toxic gas with corrosive fumes. According to an article in Pat Tummon's Environment Hawaii, a description of nitrogen tetroxide is drawn from the Medical Bulletin of the U.S. Army Medical Department, Feb., 1988 as follows: "One third of all people exposed to 50 ppm or more of nitrogen tetroxide will not survive." Even mild exposure can bring on disease that can last up to three weeks. Nitrogen dioxide has been reported to be absorbed through the lungs into the bloodstream from which it is disseminated to extrapulmonary sites in the body. It is lethal to laboratory animals in some concentrations. Symptoms prior to death observed in these studies include convulsions, seizures, change in motor activity, respiratory depression, and pulmonary edema and methogloblinenemia (which cystalizes the blood).

Aluminum oxide is used in solid rocket motors. The Delta Rocket uses 116 tons of solid propellant, more than 232,000 pounds. The rocket exhaust emitts 35 tons of aluminum oxide with each rocket launched. This particulate matter is less than 1 micron in diameter. "Upon inhalation, aluminum is deposited in the lungs where retention of 90 to 100 percent of inhaled aluminum oxide particles occurs...Inhalation exposure of laboratory animals to dusts of aluminum oxide show that this substance is retained in the lungs." (VOL. 1, 5-8) Dr. Daniel P. Perl, as director of neuropathology at Mt. Sinai Medical Center conducted research on laboratory animals which demonstrated that nasally inhaled aluminum particles caused lesions and tangled nerve fibers in the brain identical to those found in Alzheimers victims. Aluminum phytotoxicity on plants causes overall stunting of a plant, dark green leaves, purpling of stems, death of leaf tips, and damaged root systems.

Hydrogen chloride is an extremely acidic exhaust product of great concern to human health because of the potential for lung irritation. The Delta rocket exhaust emitts about 15 tons of hydrogen chloride when the solid rocket motor burns. The hydrogen chloride combines with water in the atmosphere to form

hydrochloric acid, and possibly acid rain. Rain catchment systems may be impacted by wet deposition of hydrogen chloride as a result of emissions from a normal launch. Acid rain adversely affects plants with symptoms of leaf discoloration and premature blossom loss on fruit bearing and nut bearing trees. Atmospheric corrosion of hydrogen chloride can damage building materials, property, and pitting of metalic surfaces such as the metal roofs widely used on the Big Island. Who will pay for the corrosive damage done to the roofs and water catchment tanks? Who will pay for crop loss due to premature blossom loss?

ASSUMPTIONS AND METHODOLOGY: It is assumed that one conflagration event occurs once in 70 years. However that is NOT the performance expectancy of the actual rockets to be used. Based on the history of the rockets, 1 in 8 Atlas rockets will blow up and one in 17 Deltas will blow up. The financial flow analysis proposed launching about 5 of each of these medium sized ELVs per year. The cancer risk assessments based on a one time exposure in 70 years does not adequately or realistically address the cummulative effect of exposure to these contaminants of concern. As for the EIS, please calculate the cumulative effects of exposures based on the performance expectancy of each of the rockets. As for worst case scenarios, include data for an entire truckload to be spilled not just one barrel. In the worst case scenario assume that four fully fueled Deltas sit on the pads when a devastating earthquake strikes toppling all four vehicles. Also calculate the exposures to be cummulative for aluminum oxide particles over a 70 year life span. What is the estimated health care cost associated with these exposures?

Also, not addressed in the EIS was my question requarding the dairies. The state Department of Agriculture has identified Kau as the best location to add new dairies. What is the route after ingestion of fallout aluminum particles, hydrogen chloride, and aerosolized unburned propellants and combustion particles once a cow has eaten these contaminants from the fields? Will any of the contaminants of concern turn up in the milk? What would be impact of contaminated milk on human health and on the state's dairy industry?

LAUNCH PADS AND STORAGE TANKS: According to the Draft EIS, the facility straddles the southwest rift zone of the Kilauea Volcano. The Great Crack, created by the the estimated 8.0 earth quake of 1823, terminates about 2,000 feet east of the northeast Pad, but smaller cracks extend to Palima Point (Vol I, 4-3) There are a number of linear cracks just to the south of the center pad. These cracks are up to a foot wide and at least 10 feet deep. The proposed launch pads are located within Hazard Zone 1. A PROBALBILISTIC ANALYSIS OF LAVA INUNDATION concluded, "that the risk of lava inundation by lava flow at the Palima Point site varies from moderate to high. The area along and

immediately downslope of the Southwest Rift Zone of Kilauea has the highest potential for burial. Recent intrusive activity along the SWRZ (1981-82) may signify that an eruption in this vicinity is very likely in the near future.

The Great Crack may represent a linear zone of deep-seated subsidence. Large scale subsidence can destroy man-made structures through tilting or shakings of the ground. A sudden down slope movement of Kilauea's south flank could expose low-lying coastal areas to tsunamis and storm waves. Rocket propellants stored at the proposed launch facility pose a hazard to people and the environment in the event that an earth quake causes a failure of containment. With the release of propellants we can expect possible fires and explosions. Storage for the Delta Rockets include 65,000 gallons of liquid oxygen (at pad), 13,000 gallons of kerosene (at pad), 1200 gallons of nitrogen tetroxide (at central), 825 gallons of Aerozine-50 (at central), 715 gallons of hydrazine (at central), and 20,000 gallons gaseous nitrogen. These figures are just for one type of rocket, several types are proposed. (Vol.I, 4-4;2-24) What other types of storage tanks would be necessary for the other proposed rockets? Can a rocket explosion along this rift zone trigger a subsidence earthquake?

Fires and explosions may impact the local population in several ways. Fires may spread through vegetation to neighboring communities, generating toxic or caustic gases as products of combustion. Explosions could cause large overpressures which may shatter windows and cause severe injuries by flying glass. Explosions can scatter unburned propellant and debris over wide areas. Toxic and causic gases can be released into the atmosphere. The Delta represents the most serious hazard because it contains the largest amounts of toxic/explosive propellants. The Delta has the explosive capacity of 95,000 pounds of TNT.

Human error is the greatest cause of accidents.

METEROLOGICAL MONITORING: The dEIS failed to include meterological monitoring. Why, when H.E. Crame was contracted to do so? HECO did some air quality monitoring at Honoapu. But H.E. Cramer's project monitoring tropospheric and stratospheric wind conditions was left uncompleted by the state. The equipment for the project sits in a warehouse in Salt Lake City. Is it that DBEDT knows that there aren't enough good condition days to allow for very many launch windows? The district of Kau is very windy, and because of the possible contamination of the stratosphere with aluminum particles, launches cannot occur when there is a southerly component to the wind, without disturbing the air quality and possibly damaging the mirrors at the Mauna Kea Observatories.

MAUNA KEA OBSERVATORIES: In 1991, Dr. Don Hall, Director of the Institute for Astronomy at the University of Hawaii states in testimony to the Legislature, "Eight telescopes are now in operation on Mauna Kea and a ninth, the W.M. Keck Observatory which will be the world's largest, is nearing completion. Operation of these facilities already injects approximately $20 million per year into the Big Island economy, employing about 200 people there. In accordance with the Mauna Kea Science Reserve Complex Development Plan, a number of other major telescope facilities are planning to locate at sites within the Mauna Kea Science Reserve. We project by the end of the decade, capital investment in telescope facilities on Mauna Kea will exceed a half billion dollars, of which approximately one-third will have been spent within the State of Hawaii, and that telescope operations will by then expend approximately $50 million annually, employing 350 people." Dr. Hall goes on to state, "The proposed development of a space launch facility on the Big Island is of extreme concern to the astronomical users of Mauna Kea because it may adversely impact astronomical observations. Areas of particular concern are outdoor lighting, radio frequency interference, and release of particulate matter into the upper atmosphere...All of the astronomical facilities on Mauna Kea have adhered fully to a comprehensive, planning, environmental and permitting process in the development of this major international astronomical research enterprise which has so benefited the State, the County of Hawaii and the University of Hawaii."

Aluminum oxide particles in the upper atmosphere act as nuclei for water molecules to form ice crystals which may obstruct the veiwing quality of the observatories. Should we sacrifice the quality of one high-tech industry to promote this dangerous, polluting launch facility? Would radio frequency from the observatories interfer with a flight destruct command from the range safety officer?

HAWAII VOLCANOES NATIONAL PARK: The National Park is the number one tourist attraction on the island of Hawaii. In 1989, annual visitation exceeded 2 million people. During peak season, the daily visitation is close to 8,000 visitors. Hawaii Volcanoes is also recognized as an international Biosphere Reserve and a World Heritage Site. It is the largest national park in the Pacific.

The hazardous toxic rocket fuels will be transported through the approximately 12 miles of Hiway 11 traversing the park which is home to several endangered species. Night lights, incidental spills, and other activities associated with the launch site can threaten a variety of species. What is the future of this unique park's economic asset to Hawaii's "ecotourism" should the spaceport become operational?

ENDANGERED AND THREATENED SPECIES: It's hard to think of endangered or threatened species without feeling like the people of Kau should be included in the classification. But since the human species is so prolific on this planet, a few thousand in our district can hardly be considered significant. At least that's what DBEDT seems to convey to us. We humans are responsible for the major environmental problems on this planet. And with the new age of space we could spread our maladies into outer space. But, by continuing to perpetuate toxic polluting industries, mankind will have no substantial future in space; let alone have a tolerable planet on which to live.

There are a number of endangered birds found within the 15KM radius of Palima Point (9miles), an area known as the zone of ecological concern. The town of Pahala is within that radius. Within the Population Control Zone (2.9 miles) are found two endangered vertebrates the Hawaiian hawk, and the Hawaiian hoary bat. The endangered Green Sea Turtle and the endangered Hawksbill turtle are also located within the Population Control Zone. There are only five known nesting sites for Hawksbill turtles in the entire Hawaiian archipelego, four are near the Palima site; near the National Park, at Kamehame Beach within the PCZ, at Punalu'u Beach, and at Ninole Cove. What is the future of these endangered species if this facility begins operation?

FINAL: Without economic justification for this toxic dangerous industry that jeopardizes the health and safety of the residents of the Big Island as well as the financial viability of the existing high tech-industry on Mauna Kea, this Spaceport project should be stopped by the Governor and the Legislature. Because pertinent economic information compiled by CH2M Hill, found in the 1990 Master Plan, was withheld from the Legislature and the public, and because millions additional taxpayers dollars were spent on this project known to be financially UNfeasible, the Attorney General's office should conduct a complete criminal investigation and not JUST a whitewash coverup of this offense.

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SEP. 30 1994

Ms. Ruth Marie Bass
P.O. Box 690
Naalehu, HI 96772

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Bass:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc., Dr. Richard Brock, Decision Analysts Hawaii, Inc., Engineering-Science, Inc., Risk Science Associates, Jon K. Matsuoka, Ph.D. and Davianna McGregor, Ph.D. contributed to the following responses.

Comment: *The Office of Space Industry has concealed pertinent economic and financial feasibility studies.*

Response: The Office of Space Industry has released to the public the 1990 draft "Conceptual Master Plan" prepared by CH2M Hill and the financial model which they developed to analyze various development scenarios. At no time did CH2M Hill report to the State that the spaceport could not be financially feasible.

Comment: *To continue to spend money on this project is a blatant waste of taxpayers' hard earned cash which is currently needed for schools, infrastructure, health care and social services for the disadvantaged. The state should not fund and complete the final EIS for the proposed spaceport. If there are interested developers, let them pick up the costs of any additional studies, land acquisition, etc.*

Response: In addition to covering improvements to schools, infrastructure, social and public-health services, the spaceport would contribute annual amounts at full development of $3.7 million to the county and $4 million to the state.

The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address those public and agency comments raised during this public review period. The State funded the EIS to disclose the impacts of building a spaceport, which the EIS does, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

In response to your comment on land acquisition, if the State acquires the land and leases the site to the developer, the State retains more control over the actions at the launch site than if it were merely enforcing permits. Launch site operators can come and go; the State is an entity that survives any corporate changes in the private sector and thus ensures that operations will continue to be bound by all of the conditions set forth in the lease, operating agreements and permits. Should a citizen have a complaint, he or she will always know whom to call for an answer.

Comment: *The Attorney General's office should investigate the Office of Space Industry and DBEDT for "misapplication of entrusted property" by spending millions on a project that is obviously financially foolish. The AG should investigate the OSI's assignment of the draft EIS contract to MCM Planning without accepting competitive bids and investigate the Hawaii Space Development Authority, a Governor appointed advisory committee, for violation of the state's "Sunshine Law" with its closed meetings and failure to maintain agendas and minutes of the meetings.*

Response: The Attorney General's office has determined that there was no impropriety in awarding the EIS contract to MCM Planning and that a competitively bid contract was not required. In fact, the original EIS contract awarded to CH2M Hill was not a competitively bid contract either, it was based on a Request For Proposal--the normal procedure for awarding contracts for professional services. For your information, MCM Planning was a member of three of the four teams that were selected as finalists for the contract, including CH2M Hill.

A lawsuit alleging that the Hawaii Space Development Authority had violated the "Sunshine Law" was found to be without merit and dismissed by Circuit Court Judge Watanabe on November 15, 1993.

Comment: *Not enough jobs for local people in exchange for the risks being taken.*

Response: The launch facility would provide far more than 120 jobs to Big Island residents. As discussed in Appendix IXA (pp. ES-2 through ES-5, 4-1 through 4-9, and 5-1 and 5-2), the launch facility would generate an estimated 690 jobs on the Big Island, of which about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka`u.

Judgments about whether the benefits of the project are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments. We believe that the EIS does this.

Comment: *What is the history of workers' compensation settlements in the rocket industry?*

Response: Workers' compensation claims, insurance rates, and claim amounts were not researched for the EIS. If the launch facility is built, such research would be done by insurance companies in order to set insurance rates for actual operations in Hawaii.

It should be noted, however, that the handling of rocket components and fuels, and the launching of rockets are conducted with extreme attention to safety in order to avoid accidents and - in case of an accident - to minimize the risk to life and property. Because of this attention to safety, U. S. launch facilities have an excellent safety record. The history of injury rates at the national ranges is less than those associated with office workers (Ullian, 1987). Workers' compensation insurance rates would be commensurate with risk and history of claims.

Comment: The financial feasibility studies use launch rates that are not justified by the market.

Response: The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. As you correctly observed, this exceeds the projected number of launches, according to recent market projections. The commercial market is difficult to forecast, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: Under the optimistic scenario, the Cash Flow Analysis shows a loss of $84.87 million after four years, while the dEIS said the development costs of the spaceport would be $420 million, not $84.87 million. The following 11 years produce a Total Financial Flow of $45.94 million on the plus side, leaving the project in the hole $374 million at the end of 15 years. At the projected rate, the launch facility is expected to break even in 24.33 years.

Response: The total development cost of the spaceport is estimated at $420 million, which is consistent with the reports. The consortium would likely only fund development of common infrastructure and service facilities at the spaceport. Individual launch companies would pay for the construction of their own launch pads and other specialized facilities (as they do at the national ranges).

Under the assumed scenario analyzed in the dEIS, the projected return on equity to the spaceport consortium is 11 percent. The rates of return are given in the Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii, February 1993. Over the first 15 years of operation, the launch facility would garner a 10.9 percent internal rate of return for the average scenario, and 18.8 percent and 3.8 percent for the optimistic and conservative scenarios, respectively. The middle range of approximately 11 percent was used consistently throughout the impact analysis.

The potential profitability of the launch facility should not be judged solely by the return to the Consortium as launch fees and other fees charged by the Consortium would be kept relatively low in order to increase the return to the launch companies. This would make a Hawaii location more attractive to them. An analogy can be made with the return received by an airport operator (equivalent to the Consortium) vis-a-vis the return to the airline companies (equivalent to launch companies) that use an airport.

In this case, the bulk of the profits go to the airline companies rather than the airport, thereby providing an economic incentive to the airlines to fly to that particular destination airport.

Comment: Calculate the cumulative effects of exposures based on the performance expectancy of each of the rockets. Based on the history of the rockets, 1 in 8 Atlas rockets will blow up and one in 17 Delta rockets will blow up. The financial flow analysis proposed launching about 5 of these medium sized ELVs per year. For worst case scenarios: assume that an entire truckload is spilled, not just one barrel and assume that four fully fueled Deltas sit on the pads when a devastating earthquake strikes toppling all four vehicles.

Response: Your history and predicted explosion rates for the Atlas and Delta are flawed. The failure rates you cited include any failure mechanism that prevents the payload from achieving the correct orbit. Also, most of the failures occurred during the development stages of the Atlas and Delta.

During the history of the Delta series of launch vehicles from 1960 to 1990 there have been 12 failures in 201 launch attempts. Of these 12 failures, only 4 were related to Stage 1 or solid rocket motor failures that affect the early phases of a launch. There has been only 1 Delta rocket failure since 1986, and none of the Delta II vehicles have failed. The Atlas series of vehicles experienced 32 failures in 245 launch attempts from 1958 to 1990. Most of these failures occurred prior to 1965. From 1970 to 1980 there were 100 launches and 10 failures. Nevertheless, it would not be unreasonable to expect more than one conflagration or deflagration type vehicle failures over a 15 year period under the conceptual plan launch schedules presented in the dEIS.

The cancer risk assessment of launch failure episodes assesses risks due to conflagration of a Delta II 7925 vehicle on the pad, conflagration of a Delta II 7925 vehicle during ascent, and deflagration of a Delta II 7925 vehicle. The resulting cumulative cancer risk (due entirely to deflagration) is given in Revised Table 8-69 (attached) and is equivalent to 4.3×10^{-7} at Pahala, 1.5×10^{-7} at Naalehu, and 2.5×10^{-8} at Captain Cook.

In the evaluation of potential health risks due to proposed activities, the reasonable maximum exposure (RME) scenario specified by EPA in its "Risk Assessment Guidance for Superfund" (EPA RAGS 1989) is used. This RME scenario is defined as the highest exposure that is reasonably expected to occur at a site. According to EPA RAGS, *"The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures."* Use of this RME scenario in the health risk assessment resulted in significant impacts due to certain activities and accidents. It would be possible to define an exposure scenario that is more "worst case" than the scenario used but this would be a waste of resources since the scenario used did result in significant impacts. If no impacts were found under the RME scenario, then reevaluation of the scenario chosen would be mandated (this is not the case, however).

This reasoning also applies to your request that an entire truckload be assumed to spill in a transportation accident rather than one barrel and that four fully fueled Deltas should be assumed to spill on the launch pads. This reevaluation is not required, however, because the spill of one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers:

> *"The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide (DEIS Volume I, page S-4)."*

Because there is no "standard" truck size for carrying containers of toxic chemicals, the number of drums analyzed in a multiple barrel spill would be highly speculative. It is also not unreasonable to restrict trucks to one barrel per load.

A simultaneous spill from four fully-fueled Deltas in an on-pad accident is not a credible event; such a situation will never happen for the following reasons: (1) there are three launch pads in the conceptual plan and because of site constraints there could never be more, and (2) all of the pads would not developed for a single vehicle; this would not allow the flexibility needed for a commercial launch operation. Finally, as stated previously, although it might be possible to define an exposure scenario that is more "worst case" than the scenario used it would be a waste of resources since the scenario used did result in significant impacts. As stated in the dEIS, Appendix VIIIA:

> *"The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank (615 gallons of Aerozine-50) is significant...Acute and chronic adverse health effects in the surrounding community will also occur from a spill of either 615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide during unfavorable wind conditions from just one worst-case on-site spill."*

Comment: *Liability insurance for all kinds of things, including "mindless acts of terrorism." According to the dEIS, all activities within the PCZ would be covered by an umbrella insurance policy covering the Consortium, the Companies, the Users, all sub-contractors, and the State. For lawsuits that affect the Spaceport such as fires or other natural disasters outside the PCZ, the State will be self-insured, thus enormous amounts of tax dollars could be absorbed by litigation and settlements. The OCST requires that at least a minimum amount of third-party liability insurance be obtained. If the OCST was required to pay for those insurance costs itself, it wouldn't be so happy go lucky about passing out licenses to new launch facilities with only [a] 2.9-mile PCZ.*

The other big question is who will insure this $420 million facility, its rockets and expensive payloads, when the project has been located in the highest risk zone for lava. Will the state be the self-insured entity covering the losses at the facility in the event of earthquake and lava inundation? Will the state pay for personal injury and property damage from a chemical accident that was triggered by a natural disaster? Will the state pay for a "mindless act of terrorism" that happens outside the facility?

Response: Liability and insurance would be addressed in the Operating and Site Development Agreement (OSDA) that the State would negotiate with the launch companies that form the Consortium. An outline for the text of an OSDA (Appendix XE) shows a section called General Terms: Indemnification and Insurance. In this section, the launch companies would agree to indemnify and defend the State and the County--a standard clause in all State contracts. They would also agree to assume the risk and pay damages from accidents, including those which injure others or cause damage to personal property. The companies could, in turn, purchase insurance to cover this potential eventuality.

Even though the State chooses to be self-insured, it would still be able to protect itself from being liable to the launch companies for natural disasters originating outside the PCZ boundary by changing the Management Plan (Appendix XE referenced above) to specifically indicate that the State would not be liable to the launch companies or the Consortium for natural disasters such as fires, earthquakes, or lava flows, within or outside the Population Control Zone. "Mindless acts of terrorism" could also be mentioned if this were considered to be a real threat.

As you mention in your letter, it may turn out to be difficult for the launch companies to secure insurance, or the insurance may be quite expensive. Potential launch companies would have to factor this into their cost of doing business at the Ka`u site.

Comment: *OSI hopes to use the dEIS as the basis to seek legislative funding for the land acquisition package. 10,400 acres are needed for the entire project. 1,200 are needed for the launch complex. What is the projected cost to the taxpayers?*

Response: The answer to this question is dependent on the fair market price of land at the time of acquisition. Currently the land is assessed at more than $1,000 per acre. Then that would cost the state $10,400,000. And it may be fair to assume that the ocean front property is worth more. Even with the use of eminent domain, the State must pay fair market value. Or the State can choose to seize land rights by imposing covenants, restrictions and conditions on the landowners, thereby effectively depreciating the current land value.

The developed or improved portion of the launch facility would cover about 1,000 acres--most of which is already owned by the State of Hawaii. The remaining land needed for the developed or improved portion of the launch facility would be purchased at its fair-market value.

The undeveloped or unimproved lands within the Population Control Zone would cover more than 9,000 acres. These undeveloped or unimproved lands that are privately owned would remain in private ownership and available for agricultural use. However, landowners would be compensated for any decrease in the value of their land due to reduced development potential (see Appendix IXA, p. 7-12 and Appendix IXE, pp. 5-7). Furthermore, any covenants, conditions or restrictions on landowners would require mutual written agreement between the State and the landowner.

Although it is not estimated in the dEIS, the cost of obtaining land rights would be a fraction of your estimate of $10 million since you assume that the entire 10,400 acres would be purchased. As indicated above, the 10,400 acres includes some land which is already owned by the State, and also includes substantial acreage in the Population Control Zone which would remain under private ownership.

The cost of purchasing land rights was not estimated in the dEIS for two reasons. First, if such an estimate were to be made, it could affect negotiations. Second, estimates of land cost and rent were not needed for the economic-impact portion of the dEIS because land rent received by the State from the Consortium is expected to be about the same as, or somewhat more than, the debt service paid by the State for the cost of land rights (see Appendix IXA, p. 8-3). Thus, the net impact on State finances would be zero, since the expenditures on the debt service on the land would be canceled out by the rental income.

Comment: *The State-owned lands at Palima Point are ceded lands. Where are OHA's and the general public access to address the dispensation of ceded lands?*

Response: The use of ceded lands on the Island of Hawaii has become an issue of concern by Native Hawaiian beneficiaries. These interests oppose long-term commitment of the ceded lands before Hawaiians have negotiated settlement of their sovereign claims. As was the case with the establishment of a "safety zone" on ceded lands of Nohili for test rocket launches from the missile base, the Department of Land and Natural Resources would have to grant an easement in order for the Population Control Zone to be established at Palima Point. The granting of an easement would be subject to public hearings, as required by the Chapter 91 Administrative Procedures Act. Thus, the Ka`u community and Hawaiian groups would be afforded an opportunity to register and express their concerns.

Comment: *The powers of eminent domain would enable the Space Authority to increase the size of the PCZ, perhaps homes in Pahala would be subject to the State's use of eminent domain. All this wonderful revenue ($3.7 mil to County and $4 mil to State) was to provide for better schools, infrastructure, social and public health services. This is not necessarily so with this HSDA bill §§10A which states, "All revenues and receipts derived by the Authority from any project or under a project agreement pertaining thereto shall be exempt from all state and county taxation." First OSI tells the taxpayers that a private developer will build the facility, yet OSI created a bill authorizing HSDA to develop the facility on behalf of the state, and then exempted the revenues derived from HSDA from state and county taxation, as well as exempted activities in the space development district from state and county laws.*

Response: The State has no interest in increasing the size of the PCZ. It is anticipated that any purchase of land within the PCZ would occur through friendly condemnation at its fair-market value as determined by appraisals and through negotiations (Appendix IXE, pp. 3 and 4).

The annual amounts at full development of $3.7 million to the county and $4 million to the state are not the total tax revenues that would be available to cover school, infrastructure, social and public-health services. Rather, these amounts are the net tax revenues that would remain after the county and state fund supporting infrastructure and services.

It is true, however, that the Authority would be exempt from taxation, as is the case with all state authorities and agencies; it makes little sense for the state to tax itself. But private companies - the Consortium, the launch companies, various users of spaceport, businesses that supply goods and services to spaceport, etc. - would be subject to the normal state and county taxes.

The analysis contained in the dEIS of the impact of spaceport on state and county revenues and expenditures (Appendix IXA, Chapter 8) is correct.

Comment: *SDI Weapons or nuclear material may be used at or launched from the site. Although a state statute is in place prohibiting such use, the Attorney General has made it clear that we cannot enforce that provision against the federal government. On January 31, 1991 the Attorney General of the State of Hawaii rendered an opinion on whether the federal government would be able to launch space vehicles from a State or civilian spaceport located in Hawaii during peacetime, without the consent of the State. The Attorney General concluded that "We believe that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, either directly or indirectly, during peacetime or wartime, and that as a result of such preemption, vehicles carrying payloads in violation of Act 172 could be launched from a spaceport located in Hawaii."*

Response: Although it is possible that the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else state threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: *The majority of the Big Island residents do not want a spaceport. The question of mindless acts of terrorism is not addressed, with the exception of a single bullet piercing the casing of a solid rocket motor. If the dEIS consultant thinks that a single bullet is the worst case scenario of a mindless act of terrorism, the consultant should watch more TV news. What is the worst case scenario for a mindless act of terrorism during transportation of propellants and at the facility? After reading the dEIS, more people are likely to oppose the spaceport.*

Response: Whether the ignition of a solid rocket motor is caused by the piercing of a single bullet or more than one bullet, the effects would be virtually the same. Once the motor is ignited it would be difficult to extinguish regardless of the number of bullets that started the burning.

The liquid propellants are very flammable and also would most likely burn if their containers were to be pierced by a bullet. The ignited liquid propellants do not pose a toxic hazard, rather, the thermal energy from resulting fire or explosion would pose the greatest concern. This is true of incidents occurring on the site, as well.

Any public facility is a potential target for terrorist acts. (Likewise, other vehicles that haul flammable or explosive materials such as propane or gasoline pose a potential danger to the public as a result of terrorist acts or transportation accidents). Precautionary measures can be taken, however, to prevent terrorist-related events from occurring. For example:

- the transportation vehicles or rocket motor containers could be hardened to prevent bullets from penetrating the containers.
- Access to and within the spaceport would be controlled according to the level of danger involved. For example, visitors would be allowed to access the beach or other common areas, however, the propellant storage areas and other sensitive facilities would be closed to all unauthorized persons.

Attached are the procedures that are in force at Vandenberg Air Force Base to counter and control such potential acts, and could possibly serve as a model for the developers of the facility.

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Comment: *Atmospheric corrosion of hydrogen chloride can damage building materials, property and pitting of metallic surfaces such as metal roofs widely used on the Big Island.*

Response: According to NRC (1976), *"Chlorine, hydrogen chloride, and the acid solutions derived from them when they are dissolved in water are considered very corrosive."* Furthermore, *"The normal rate of atmospheric corrosion is influenced by temperature, relative humidity, sunlight, and the presence and characteristics of particulate matter and trace gases."* Increased temperature may result in increased corrosivity or, if the increased temperature causes a decrease in relative humidity, it may inhibit corrosion. Corrosion may involve particulate matter such as acid mists or solid particles, such as sodium chloride. Hydrogen chloride gas may dissolve in the adsorbed water film resulting in corrosion (NRC 1976).

It is very difficult to quantify the contribution of hydrogen chloride emitted during launch activities on corrosion damage to exposed metal surfaces that occurs, due to other naturally occurring atmospheric corrosive agents. Also, high ambient temperature and high relative humidity of the island of Hawaii present a situation that is very favorable for metal corrosion. The area near the proposed site of the Spaceport facility is subject to atmospheric concentrations of naturally occurring corrosive substances such as sodium chloride from the ocean and emissions of acidic gases and particulates from nearby Kilauea Volcano including sulfates, nitrates, chloride, fluoride, etc. (DEIS Appendix VIIIA Section 11.0).

The only method by which increased corrosivity might be assessed is to estimate the increased pH of rainfall falling on a metal roof due to wet deposition of HCl following a normal launch or conflagration event. In Appendix VIIIA (page B-7) of the dEIS it was determined that the concentration of HCl due to wet deposition following a normal launch (assuming that immediately after launch it begins to rain) is 0.45 mg/l. In the event of a conflagration episode, assuming that all of the HCl possibly generated by the nine solid rocket boosters is released, the concentration of HCl due to wet deposition would be 2.1 mg/l. The pH of the water collected following these two events would be 4.9 and 4.2, respectively (calculated according to the algorithm in DEIS Appendix VIIIB, page 3-7). The pH of a neutral solution is 7.0, the pH of municipal drinking water is required to be between 6.5-8.5 according to the National Secondary Drinking Water Regulations (secondary maximum contaminant levels; Last 1980).

Average pH of rainfall in the continental United States ranges from 4.2 in the Ohio area (considered acid rain) to levels greater than 5.0 west of the Mississippi (up to 5.4 in Northern California and Oregon; Kulp 1988). The contribution of rocket exhaust clouds to the formation of acid rain around Palima Point may be minimal because acid rain is also formed through the liberation of sulphates and nitrates through volcanic activity. A study of acid rain in the area around Volcanoes National Park measured the pH of rainwater and found that the pH varied between 2.6 and 4.6 during the study period (Nachbar-Hapai et al. 1989). Thus, normal rainfall in the area is already more acidic than wet deposition of HCl during a conflagration event. Given the ambient conditions of the area and the fact that atmospheric acidic chemicals already exist, the contribution of HCl emitted following launch episodes to "naturally" occurring corrosion is probably not significant.

Comment: *Exposure of grazing dairy cows: will pollutants deposited on fields where dairy cows are grazing appear in milk?*

Response: A screening analysis of the beef ingestion pathway is presented in the dEIS (Appendix VIIIA); the approach can be expanded to assess potential risks due to ingestion of milk from local dairy cows. This potential exposure pathway is not expected to present significant human health risks because none of the substances potentially emitted during normal launches or during conflagration and deflagration events are bioaccumulative (in other words, substances such as aluminum oxide, hydrogen chloride, and hydrazine do not accumulate in animal tissues such as meat or milk). An evaluation of this exposure pathway is attached (Attachment B).

Comment: *What other types of storage tanks are necessary for the other proposed rockets? Could a rocket explosion along this rift zone trigger a subsidence earthquake?*

Response: All propellant storage requirements for candidate rockets are presented and assessed in the dEIS. If an actual project is proposed, new candidate rockets may require supplemental analyses. The TNT equivalencies, which determine the explosive strength of the rockets, and additional geological assessments are required in order to assess the potential for triggering a subsidence earthquake.

Comment: *The dEIS failed to include meteorological monitoring. H.E. Cramer's monitoring of tropospheric and stratospheric wind conditions was left uncompleted. Is it because DBEDT knows there are not enough good condition days to allow for very many launch windows? Launches cannot occur when there is a southern component to the wind, without disturbing the air viewing quality and possibly damaging mirrors at the Mauna Kea Observatories.*

Response: Meteorological monitoring of surface winds took place for several years at Honuapo Bay. H.E. Cramer company obtained high altitude wind data from Hilo. H.E. Cramer's proposed monitoring equipment did not include the tropospheric and stratospheric wind measurements. Additional sounding data was collected from Palima Point as specified by Dr. Thomas Schroeder, a meteorologist at the University of Hawaii. This information was utilized by Dr. Schroeder to develop representative meteorological profiles for analysis in the dEIS.

While it is clear that extensive on-site monitoring would be conducted to provide a prospective developer with the detailed information necessary to plan and perform launch operations, the data collected is adequate for EIS studies. DBEDT's consultant, ACTA, has experience with operating the toxic dispersion models for literally thousands of meteorological balloon soundings for Cape Canaveral Air Station, Vandenberg AFB, and Edwards AFB. This experience has given ACTA insight into the meteorological patterns which typically result in the most unfavorable toxic dispersion conditions.

The seven atmospheric soundings used as a basis to analyze the dispersion of rocket exhaust plumes and abort clouds were intended to cover the range of the most prevalent weather patterns expected to occur in the Palima area. When examining the feasibility of a spaceport operation and its potential impacts on the environment and local population, it is reasonable and prudent to examine the range of meteorological conditions which apply to the area. The existence and documentation of "best- case" scenarios indicates that there are certain weather patterns which are favorable to safe launch conditions and this information is of value to potential customers of an economically viable space launch operation. Likewise, every effort was made to understand the unfavorable aspects of the Palima meteorology in order to define a "reasonable worst case scenario" for assessing the health risks associated with potential launch aborts and accidental spills.

As a result of these considerations, a hypothetical worst case meteorological data set was defined by Dr. Thomas Schroeder for use in the toxic dispersion analyses. DEIS Appendix VID (pages 2-1 through 2-4, 4-1 through 4-11) presents a description of the important meteorological features which affect the rise, stabilization, and dispersion of exhaust plumes. The "worst case Kona" weather condition was defined with the following features:

* Base of the persistent tradewind inversion was lowered to 5000 feet from 6360 to represent a lower "trapping lid" beneath which the rocket exhaust gases are trapped and disperse back to the ground level.

* Winds at all elevations were oriented in the same direction thereby eliminating the enhanced gas dispersion attributable to wind shear.

Both of these modifications result in conditions which limit the dispersion rate of the rocket exhaust and result in increased ground level concentration predictions. A further "worst-case" condition was added to the toxic hazard analysis by assuming that the wind direction on any given day could direct the exhaust cloud directly toward any of the 66 sensitive receptor points identified by the State of Hawaii. Therefore, no precondition was placed on direction of travel of an exhaust plume. The maximum concentration exposure levels for these worst case weather and plume travel scenarios were documented and tabulated in Appendix VID for each possible vehicle abort mode and each chemical species of concern and applied to the candidate launch vehicle containing the largest quantities of both liquid and solid propellants (Delta II 7925). The human health risk assessment (Appendix VIIIA, pp. 2-2 and 6-4) and ecological risk assessment (Appendix VIIIB, pages 3-11 to 3-13) conducted by Risk Science Associates also included evaluation of hazard indices based on exposure levels derived from these worst case scenarios.

The meteorological conditions applied to predict toxic gas dispersion from accidental spills of liquid propellants which evaporate from pools without combustion were also modeled over a range of wind speeds, atmospheric stabilities, wetted pool areas and inversion heights in order to identify the conditions which result in the largest toxic hazard corridors. Once again, the assumption was made that the surface winds transporting the hazardous gas could travel in any direction and concentrations at the 66 sensitive receptor sites were calculated assuming the plume traveled from the spill site directly toward the receptor. The conservative nature of these modelling assumptions -- and the expectation that these scenarios would have a high probability of not underestimating the toxic hazard -- are addressed in more detail in Appendix VID (pages 5-1 to 5-3).

The maximum spill quantities for the hypergolic liquids were based on 728 gallons of nitrogen tetroxide and 615 gallons of Aerozine-50 which represent the total Stage 2 tankage of a fully fueled Delta II launch vehicle. These spill quantities combined with the worst case weather conditions are deemed to represent worst case scenarios and they far exceed the accidental releases of liquid propellants which have been experienced in thousands of propellant transfers at the mainland launch facilities.

In summary, during actual operations of the Palima spaceport the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I (page 2-14) states:

> *"Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket. Air quality and meteorological measurements are conducted continuously to ensure rapid detection and response to elevated levels of hazardous vapors."*

This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would also be required to comply with federal and state emergency preparedness and

hazardous materials handling requirements as described in "Emergency Response Capabilities" (DEIS Volume I, page 5-136).

An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis identified certain conditions where there is a relatively high probability of transport of a rocket plume into the field of view of the observatories. These conditions occurred during both south and east launch trajectories with the highest percentage of unfavorable wind directions occurring during an east launch. A copy of the report is attached (Attachment C).

The scope of the analyses was limited to identifying the percentage of time favorable wind directions would be present. The wind direction analysis provides the first step in understanding the potential for favorable launch conditions. However, even with unfavorable wind directions, high wind speeds could produce adequate transport to clear the plume from the field of view within a short time. Further refinement of the analyses to include the wind speed and the correlation between winds at different altitudes is left to future tasks in the event the project moves forward.

The new results described in the attached report provide information not available during the preparation of the draft EIS. The analysis suggests that it may be possible to modify the mitigation to increase the probability of favorable launch windows without compromising astronomical observations. Specifically, it might be acceptable to replace the prohibition against launches when there is a southerly wind component with a stipulation that ..."there will be no launches when the wind would carry the plume above a specified elevation (e.g. 30 degrees) at any time, as view from the observatories." Also, the requirement that the plume be transported out of the field of view (sky above 15 degrees elevation) within two hours of launch might possibly be replaced with a requirement that ..."the plume must not be in the field of view for longer than two hours." This would mean that the two-hour clock would not necessarily have to start at launch.

It is fully understood that obscuration by plumes is a potentially serious problem for which the currently proposed mitigation (as stated in Chapter Five of the dEIS) is believed to be adequate. In the event the project moves forward, and refined analysis - as mentioned above - is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH IfA for approval.

Comment: *Would radio frequency from the observatories interfere with a flight destruct command from the range safety officer?*

Response: The command destruct signal is encoded and assigned a unique frequency to assure that only the Range Safety Officer can intentionally destroy the rocket. Other

radio frequency interference issues are discussed in Volume I (Chapter 5). Continuous coordination with UH IfA will be mandatory during the site planning and design phases of the spaceport. Actual measurements will be made of terrain blockage and instrument susceptibility in order to refine guidelines for the location and operation of range instrumentation systems.

Comment: *What is the future of Hawaii Volcanoes National Park and the future of the park's unique economic asset to Hawaii's "ecotourism" should the spaceport become operational?*

Response: Impacts to Hawaii Volcanoes National Park are discussed in Volume II, Chapter Seven of the dEIS. The attraction of active volcanoes that visitors can view, smell and almost touch (without leaving the United States) will ensure that the park's unique economic asset to Hawaii's "ecotourism" will continue, with or without a spaceport.

Comment: *What is the future of endangered species if the facility becomes operational?*

Response: The dEIS presents hazards involved with space launch operations, but it does not consider the mitigating effects of systems and procedures to control hazards. The area immediately adjacent to Cape Canaveral is a wildlife preserve because residential and commercial land development has been restricted and the marsh habitat preserved. Merritt Island Wildlife Refuge in Florida (which is part of Kennedy Space Center/Cape Canaveral Complex), is an estuarine system that is host to many species. Similarly, at Vandenberg Air Force Base, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

As noted in Appendix IIID of the DEIS,

"Human activities such as urban and industrial development, dredging and commercial fishing potentially pose a threat to turtle populations and their habitat ...It is the destruction or modification of beaches that has had the greatest impact on the ability of turtle populations to sustain their numbers."

Large open space areas at launch facilities that are restricted for safety reasons, where human activities and industrial development are not allowed, are features of Cape Canaveral and Vandenberg AFB. The open spaces provide valuable habitat for endangered sea turtles, alligators, and many bird species.

It is also stated in Appendix IIID that:

"Sea turtles nest on the beaches of Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success...lighting procedures are inspected by the U.S. Fish and Wildlife service

for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill...it is suggested that a light management plan similar to Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built."

References:

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attachments

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TERRORISM THREAT CONDITIONS (THREATCONS)

1. **THREATCON ALPHA.** This condition is declared as a general warning of possible terrorist activity, the nature and extent of which are unpredictable when the circumstances do not justify full implementation of the measures contained in a higher THREATCON. However, it may be necessary to implement selected measures from THREATCON BRAVO. The measures in THREATCON ALPHA must be capable of being maintained indefinitely.

2. **THREATCON BRAVO.** This condition is declared when there is an increased and more predictable threat of terrorist activity even though no particular target has been identified.

3. **THREATCON CHARLIE.** This condition is declared when an incident occurs or when intelligence is received indicating that some form of terrorist action is imminent. Implementation of this measure for more than a short period will probably create hardship and will affect the peacetime activities of the unit and its personnel.

4. **THREATCON DELTA.** This condition applies in the immediate area where a terrorist attack has occurred, or when intelligence has been received that terrorist action against a specific location is likely. Normally, this THREATCON is declared as a localized warning.

THREATCON ALPHA. The following measures are the minimum recommended actions:

Measure 1. At regular intervals, remind all personnel, including dependents to be suspicious and inquisitive about strangers, particularly those carrying suitcases or other containers; alert for unidentified vehicles on or in the vicinity of Vandenberg AFB; and alert for abandoned parcels or suitcases or any unusual activity.

Measure 2. Keep available at all times key personnel or other appointed personnel who have access to plans for evacuating buildings and areas in use and for sealing off any areas where an explosion or attack has occurred.

Measure 3. Secure buildings, rooms, and storage areas not in regular use.

Measure 4. Increase security spot checks of vehicles and persons entering areas, buildings, and facilities and nonclassified areas under your jurisdiction.

Measure 5. Limit access points for vehicles and personnel commensurate with a reasonable flow of traffic, where possible.

Measure 6. As a deterrent, apply one of the following measures from THREATCON BRAVO individually and randomly:

a. Secure and regularly inspect all buildings, rooms, and storage areas not in regular use.

b. At the beginning and end of each workday and at other regular and frequent intervals, inspect the interior and exterior of buildings in regular use for suspicious activity or packages.

c. Check all deliveries to your work area. Advise dependents to check all home deliveries.

Measure 7. Review all plans, orders, personnel details, and logistic requirements related to the introduction of the higher THREATCON.

THREATCON BRAVO. The following measures are the minimum recommended actions:

Measure 8. Repeat measure 1 and warn personnel of any other form of attack to be used by terrorists.

Measure 9. Keep all personnel involved in implementing antiterrorist contingency plans on call.

Measure 10. Check plans for implementation of the measures contained in the next THREATCON.

Measure 11. Where possible, vehicles and such objects as crates, trash containers, etc., are to be moved at least 25 meters from buildings, particularly those buildings of a sensitive or prestigious nature. Consider the application of centralized parking.

Measure 12. Secure and regularly inspect all buildings, rooms, and storage areas not in regular use.

Measure 13. At the beginning and end of each workday and at other regular and frequent intervals, inspect the interior and exterior of buildings in regular use for suspicious packages.

Measure 14. Examine all mail for letter or parcel bombs.

Measure 15. Check all deliveries to your work areas. Advise dependents to check all home deliveries.

Measure 16. Upon entry of visitors to the unit, physically inspect them and a percentage of their suitcases, parcels and other containers.

Measure 17. Wherever possible, operate random patrols to check vehicles, people, and buildings.

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Measure 18. Remind drivers to lock parked vehicles and to institute a positive system of checking before they enter and drive a vehicle.

Measure 19. Implement additional security measures for high-risk personnel, as appropriate.

THREATCON CHARLIE. The following measures are the minimum recommended actions:

Measure 20. Continue all THREATCON BRAVO measures or introduce those outstanding.

Measure 21. Keep available at their places of duty, all personnel who are responsible for implementing antiterrorist plans.

Measure 22. Limit access points to absolute minimum.

Measure 23. Strictly enforce control of entry and search a percentage of vehicles.

Measure 24. Enforce centralized parking of vehicles away from sensitive buildings.

Measure 25. Erect barriers and obstacles to control traffic flow into work areas.

THREATCON DELTA. The following measures are the minimum recommended actions:

Measure 26. Continue or introduce all measures listed for THREATCON BRAVO and THREATCON CHARLIE.

Measure 27. Identify all vehicles within operational or mission support areas.

Measure 28. Search all vehicles entering your work area as well as vehicles' contents.

Measure 29. Control all access and implement positive identification of all personnel to your work area.

Measure 30. Search all suitcases, briefcases, packages, etc., brought into your work area.

Measure 31. Make frequent checks of the exterior of buildings and of parking areas.

Measure 32. Minimize all administrative journeys and visits.

Assessment of the Potential Risks Due to Ingestion of Milk from Local Dairy Cows

Prepared By Dr. Alvin Greenberg, Ph.D., Risk Science Associates

The evaluation below is not only an overestimation but, quite frankly, lacks scientific basis. Nevertheless, this "academic" exercise is being conducted to demonstrate that this is not a significant exposure pathway.

In this screening analysis it is assumed that a dairy cow living near Pahala is exposed to hydrazine at a ground level concentration of 49.7 $\mu g/m^3$, that emitted hydrazine disperses within one hour, and that other pathways of exposure are insignificant when compared to the inhalation pathway. It is further assumed that the milk transfer coefficient is equivalent to the value listed by CAPCOA (1992) for 2,4,6-trichlorophenol or 4.2×10^{-5} days/kg. (In reality, hydrazine would not be transferred to milk and thus the exercise would end here). The average concentration of hydrazine in animal tissue is determined below.

$CONC_{milk}$ = $GLC \times F_i \times RR \times 1/24$

where

$CONC_{milk}$ = average concentration in milk, 7.0×10^{-3} $\mu g/kg$

GLC = ground level concentration of hydrazine at Pahala, 49.7 $\mu g/m^3$

F_i = milk transfer coefficient, 4.2×10^{-5} days/kg

RR = respiratory rate of a cow, 80 m^3/day

1/24 = 1 hour exposure of cow per 24 hour day

In order to evaluate dose and subsequent risk to a person ingesting milk from a cow living near Pahala, certain overly conservative assumptions must be made. First, it was assumed that conflagration/deflagration occurs everyday of a person's life such that the 1 hour concentration of hydrazine released occurs daily. Secondly, it was assumed that a person's sole source of milk for their entire lifetime is from cows living near Pahala and that a person drinks an average of 0.3 kg/day for their entire lifetime, and third it is assumed that the concentration of hydrazine in milk is equivalent to the concentration of hydrazine determined in meat (nonbioaccumulative in milk). Evaluation of dose via milk ingestion is described below.

$$DOSE_{milk} = \frac{CONC_{milk} \times IR_{milk} \times GI \times FI}{BW \times 1000}$$

where

$DOSE_{milk}$ = dose via milk ingestion, 3.0×10^{-8} mg/kg/day

$CONC_{milk}$ = average concentration in milk, 7.0×10^{-3} $\mu g/kg$

IR_{milk} = ingestion rate of milk, 0.3 kg/day

GI = gastrointestinal absorption of hydrazine, 1.0

FI = fraction of milk from local cows, 1.0

BW = average body weight of an adult, 70 kg

1000 = conversion factor, $\mu g/mg$

Lifetime cancer risk is determined below:

$RISK_{beef}$ = $DOSE_{beef} \times$ Potency Slope = 9.0×10^{-8}

where

Potency Slope = $3.0\ (mg/kg/day)^{-1}$

Lifetime risk via dairy milk ingestion under this scenario is 9.0×10^{-8}. In order to compare these results with the results presented in the health risk assessment for human health risks due to conflagration/deflagration events, this value is normalized to one conflagration/deflagration event occurring in a lifetime, and the resulting risk is 3.5×10^{-12}.

$9.0 \times 10^{-8} \times 1$ hr/dy $\times$ yr/365 dys $\times$ lifetime/70 yrs $= 3.5 \times 10^{-12}$

This risk value is significantly less than the generally accepted insignificant risk level which is often defined as 1×10^{-6}.

c: Ken Munechika, DBEDT

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Homescapes
D. Hunter Beyer
P.O. Box 374
Volcano, Hawai'i 96785
Nov 17, 1993

Governor, State of Hawai'i
c/o Office of Environmental Quality Control
220 S. King Street
Honolulu, Hawai'i 96813

Re: Conceptual plan for a "Spaceport" on the Big Island of Hawai'i.

Dear Governor John Waihee,

I strongly protest against the continuance or the acceptance of the "Draft Environmental Impact Statement" (DEIS) regarding the "Spaceport" on this island for the following reasons:

There has been insufficient disclosure to the public on the risks involved in such an operation. The risk of nuclear & chemical fuels ranges from stress to death. Not only for the people, but for all the inhabitants present & future.

It is becoming well known, too, that one of the purposes for the rocket- launching facility is to send radioactive waste toward the sun. The plan is to ship the wastes by sea to Hawai'i, transfer the radioactive material to trucks, drive from Hilo, through our Volcano International Biosphere, down to South Point to be transferred again to rockets.

This is criminal insanity for several reasons; danger and risk to everyone all along the path, possible human error and mechanical failure in transport, handling, and storage, etc.

And, that this form of waste disposal is safe can only be theoretical.

There is also documented evidence that every time a rocket is launched, the ozone hole increases exponentially; something we know we should avoid at all costs.

How can we be so arrogant as to take all these risks? How can the money be so much more important than the danger to all involved?

How can you propose that this will create jobs that anyone here would aspire to, let alone be qualified for?

How could any "Environmental" impact statement ever sanction all this??

I support the immediate & total withdrawal from the DEIS process & DO NOT authorize Governor John Waihee to continue with this project. Enough of our money has been wasted already. Please look to your wisdom.

So be it,

DHB

12-292

JOHN W.
GOV.
JEANNE K. SCH
DIR
RICK E
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

D. Hunter Beyer
Homescapes
P.O. Box 374
Volcano, HI 96785

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear D. Hunter Beyer:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc. and Risk Science Associates contributed to the following responses.

Comment: *I strongly protest against the continuance or the acceptance of the dEIS regarding the spaceport on this island for the following reasons. There has been insufficient disclosure to the public on the risks involved in such an operation. The risk of nuclear and chemical fuels ranges from stress to death. Not only for the people, but for all the inhabitants present and future.*

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the Health Risk Assessment, *"Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures."* The health risk assessment uses algorithms described in EPA methodology that are *"conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."*

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. *"The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide"* (page S-4 of Volume I). Similarly, *"The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant"* (page S-8 of Volume I).

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, *"On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:*

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: *It is becoming well known, too, that one of the purposes for the rocket launching facility is to send radioactive waste toward the sun. The plan is to ship the wastes by sea to Hawaii, transfer the radioactive material to trucks, drive from Hilo, through our Volcano International Biosphere, down to South Point to be transferred again to rockets. This is criminal insanity for several reasons; danger and risk to everyone all along the path, possible human error and mechanical failure in transport, handling, and storage, etc. And, that this form of waste disposal is safe can only be theoretical.*

Response: You are correct in your conclusion that transporting radioactive wastes across the sea to Hilo and then by land to the Ka`u District to be launched by rocket ships to the sun would be a very foolish thing to do. Fortunately, despite what you may have heard, there is no plan to do any such thing.

In 1973, James Schlesinger, then chairman of the Atomic Energy Commission, asked NASA to consider shooting high-level radioactive wastes into the sun aboard the space shuttle. NASA rejected the idea on the basis of high risk and costs. In 1991 the Congressional Research Office looked into the concept again and concluded that, while the idea is technically feasible, high costs and risks would be problematic.

We have no knowledge of any plan ever seriously proposed to launch nuclear waste from any spaceport. Safety and economics make the concept not feasible. From an economic standpoint, the payload capabilities of the two biggest vehicles discussed (Delta II and Atlas IIAS) are at the very most 2000 lb. and 4100 lb. for placing a satellite in a geosynchronous orbit around the earth. No data are available about the sending of a payload to the sun using these boosters, but it takes considerably more energy than to get into a geosynchronous orbit. Thus the payload capabilities are even less than those noted. An enormous amount of spent nuclear power plant fuel is located at the sites of the U.S. nuclear power plants. Since the nuclear waste is so heavy, and the payload capabilities of the rockets are so limited, it will be impossible even with a very rapid launch schedule to even put a dent into the amount of waste that needs to be eliminated. Moreover, the high launch costs to place a payload into that type of path/orbit (up to $40,000 per pound), are prohibitive.

In addition, there are safety considerations. At this time in the United States, there is minimal to no allowed movement of radioactive waste by truck or any other means of transportation. Thus, the likelihood of waste even getting to a port is very, very small. Currently almost all nuclear power plant spent fuel remains on the power plant site. With such strict safety rules, it has no place to go.

Spent fuel is highly radioactive and much of the material is extremely toxic as well. Containers used in the transport of nuclear materials must provide shielding from radiation and must be sturdy enough to prevent spillage of the material should an accident occur during transport. Containers suitable for stowing nuclear waste payloads have not been designed, but the shielding and survivability requirements would mandate relatively massive containers further reducing the amount of waste that could be launched into space. Admittedly, the disposition of nuclear waste is an enormous problem, but sending it into space is not the solution.

A final important note: the nuclear power generators on board some spacecraft are small devices. Containers for these devices would not be suitable for storage of spent fuel due to fuel handling problems inherent in dividing the material into many small containers and due to the inefficiency of storing many small containers in the payload compartment.

Comment: *There is also documented evidence that every time a rocket is launched, the ozone hole increases exponentially; something we know we should avoid at all costs.*

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Response: It is understood that emission by-products from rocket motors will deplete atmospheric ozone. Of biggest concern is the potential depletion of stratospheric ozone through either migration of ozone depleting compounds from the troposphere to the stratosphere or direct injection of ozone depleting compounds into the stratosphere. Effects from this depletion can be both local and global. Local effects include the potential for an "ozone hole" to form along the launch corridor. NASA has indicated that even though rocket launches can have a significant effect on the stratosphere by reducing the ozone substantially (perhaps >80 percent) within the expanding exhaust plume up to 3 hours after launch (World Meteorological Organization, 1991), the corresponding column ozone depletion is less than 10 percent.

There have been some questions raised regarding the validity of the 10 percent reduction claim and research is on-going that addresses the ozone reduction question. In any event the reduction is not exponential and recovery in the launch column begins within about three hours after launch.

On a global scale, the contribution of the rocket launches is addressed on page 5-161 of Volume I and Appendix XD. The analyses performed indicated a depletion of stratospheric ozone of about 0.009 percent/year. On page 5-162 it is also noted that the contribution of gases related to global climatic effects would not be eliminated if the launch facility is not constructed in Hawaii because the launches would still take place somewhere else.

Comment: *How can we be so arrogant as to take all these risks? How can money be so much more important than the danger to all involved? How can you propose that this will create jobs that anyone here would aspire to, let alone be qualified for?*

Response: The dEIS discloses the potential hazards (not what *will* happen, but what *could* happen) of the launch facility. The risks (the combination of the probability and consequence) of an event would be determined if an actual project is planned. We do not know what kinds of hazards or mitigating measures exist for a specific project, however, the primary objective of the State would be to ensure safety to the public. There is no basis for the assertion that money is more important than safety.

The launch facility would provide a considerable number of employment opportunities for Big Island and Ka'u residents. As discussed in Appendix IXA, and Chapter 6 of Volume II, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka'u.

The estimated 290 jobs for the local labor force in Ka'u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the space industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In the early 1970s, a number of people opposed building telescopes atop Mauna Kea. Many asserted that the telescopes would provide few jobs to Big Island residents since local residents would not be skilled enough to compete for these positions. As it has turned out, however, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents.

Experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels--not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy,

universities, airports, hospitals, computer companies, etc. If the launch facility is built, it will also be true there.

Comment: *How could any "Environmental" impact statement ever sanction all this?*

Response: We disagree with your statement that the dEIS "sanctions" the project. The dEIS discloses facts and study results and proposes mitigating measures, while avoiding conclusions as to the acceptability or non-acceptability of the impacts disclosed or the efficacy of the mitigating measures presented. The EIS is intended to provide factual data to be used as the basis for making informed decisions. This is in accordance with the definition promulgated in the Environmental Impact Statement Rules, (Title 11, Chapter 200, Section 11-200-2) which states that:

> *"...an EIS means an informational [emphasis added] document prepared in compliance with chapter 343, Hawaii Revised Statutes and this chapter and which discloses [emphasis added] the environmental effects of a proposed action, effects of a proposed action on the economic and social welfare of the community and state, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects to the action and their environmental effects."*

In compliance with Chapter 343, Hawaii Revised Statutes and the Environmental Impact Statement rules, the dEIS attempts to disclose all significant impacts (both positive and negative), generated by certain activities and accidents related to the project, in a non-judgmental manner. The objective is to provide as complete information as possible to the agencies and legislative bodies that will make the final decision as to whether or not support of the project should be continued. There are also a number of unresolved issues listed on page S-15 that, upon assessment, could play a significant role in determining whether the spaceport benefits outweigh the impact.

Comment: *I support the immediate and total withdrawal from the dEIS process and do not authorize Governor John Waihee to continue with this project. Enough of our money has been wasted already.*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address those public and agency comments raised during this public review period. The State funded the EIS to disclose the impacts of building a spaceport, which the EIS does, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

Reference

World Meteorological Organization: Scientific Assessment of Ozone Depletion: 1991. World Meteorological Organization Global Ozone Research and Monitoring Projects -- Report number 25. National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, United Kingdom Department of the Environment, United Nations Environment Program, World Meteorological Organization.

c: Ken Munechika, DBEDT

CS
Please send copy to
DBEDT / OSP

DECLARATION BY:
William Frederick Hachmeister
P.O. Box 10267
Hilo, Hawai'i 96720

IMPORTANT PUBLIC NOTICE CONCERNING THE SPACEPORT PROPOSAL

"HE WHO IS SILENT IS CONSIDERED AS ASSENTING, WHEN HIS INTEREST IS AT STAKE": the Palima Point spaceport proposal is currently being offered for review to the public. This is your ONLY chance to state your concerns in writing.

LEAVING THE PUBLIC WITHOUT RECOURSE: rule of public disclosure concerning nuclear fueled rockets does not apply to the State draft environment impact statement, since State of Hawai'i's law, Act 172, already prohibits nuclear fuels on launch vehicles. On the contrary the Federal Government does not have to comply with Hawai'i State law. Any Federal agency can use nuclear fuels on rockets or space-probes at any future date. Further, the State does not have an instrument of contract concerning the spaceport operation, launch restraints and constraints, and liabilities. Only a letter of intent from Lockheed Corporation.

NEWLY DEVELOPED "STATE OF THE ART" NUCLEAR PROPULSION (THERMIONIC) ROCKETS: nuclear propulsion rockets do exist! Thermionic performance is by far greater then that of chemical rockets that are contentiously fading into history. Thermionics provide speed and payload lift abilities that are considered important for the planetary expeditions, and are being adapted to the Ballistic Missile Defense projects. QUIETLY purchased from Russia by our government in 1991, the Bush Administration intentionally limited the public's awareness of the purchase, as reported by The Washington Post, Aviation Week and Space Technology, Christian Science Monitor, and The Wall Street Journal.

IRREPARABLE HAZARDS OF NUCLEAR FUELED ROCKETS: a thermionic rocket is capable of vaporizing and releasing considerable amounts of lethal nuclear fuels, or exploding with a force many times greater than that of Hiroshima. A single malfunction could leave the Island of Hawai'i, probably all the Hawaiian Islands uninhabitable for thousands of years. Nuclear rockets carry hundreds of pounds of PLUTONIUM or URANIUM, whereas the bomb that destroyed Hiroshima required only 2.2 pounds of plutonium, in the historical single event that ended world war II, and continues to be a major health hazard to this day.

ETHICAL VIOLATIONS INVOLVING NASA AND NUCLEAR FUELED SPACE-PROBES: "Sometimes it takes a cowboy". in 1989 I enjoined the Christic Institute's litigation to halt the launch of the NASA space shuttle Atlantis that was carrying the nuclear fueled space-probe Galileo. I gave expert testimony that my ex-employer Teledyne had provided faulty flight computers critical to the shuttle system. The Pentagon and Department of Justice had received guilty pleas, and trial convictions of Teledyne procurement executives. Therefore, significant proof was available to the judge hearing our litigation that should have ruled in our favor and halted the NASA mission. However, our motion was denied and the Launch continued. The following year the nuclear fueled space-probe Ulysses went through a similar challenge, and that litigation also failed. Twice the people of Florida were without recourse except to live in fear of a failed launch that was capable of a single event mass destruction greater than that of Hiroshima. Since 1989 Teledyne Relay's has pleaded guilty, fined, and banned from Pentagon contracts.

THE AMERICAN LAW: Qui tacet consentire videtur, ubi tractatur ejus commodo; "He who is silent is considered as assenting, when his interest is at stake".

BEFORE THE SPACEPORT PROPOSAL CAN BE STOPPED A MAJORITY OF THE PUBLIC MUST REACT NEGATIVELY IN WRITING. SEIZE THIS EXTREMELY VALUABLE OPPORTUNITY TO REPLY. DEMAND THE TRUTH AND ANSWERS TO THESE EXTREMELY CRITICAL QUESTIONS.

NEGATIVE LAND VALUES (Land Economics Feb. 1991 v67 n1 p38(7)): Hawai'i must not apply for a spaceport license from the United States Department of Transportation. Once the license is granted, we are without recourse in matters of nuclear material storage and usage. Economic researchers have found that a significant negative effect occurs on the financial value of agricultural land in the proximity of nuclear reactors (foot note (1)). I agree with members of the Hawai'i County Council and their deferring RESOLUTION 102 93 that demands the State withdraw the spaceport proposal.

THE CHOICE IS YOURS: the State of Hawai'i refuses to address these critical nuclear issues, by simply referring these issues to the Federal Environmental Impact Statement which occurs after the issuance of the license. Therefore, we the people have only one opportunity to make our feelings known. Inform your family and friends; respond to this public notice. Your written statement (optional) is also important for decision makers. Respond by mail to me or to:

Office of Environmental Quality Control, 220 South King Street, Suite 400, Honolulu, Hawaii, 96813.

My signature supports and demands the withdrawal of the spaceport proposal:

NAME	SOCIAL SECURITY	ADDRESS	TELEPHONE
Margaret B. Callan	S.S.# 575-34-4958	P.O. Box 326 Naalehu 96772	
	SIGNATURE Margaret B. Callan		
Benjamin Gomes	Social Security 575-14-4172	P.O. Box 125 Naalehu	929-7188
	SIGNATURE Benjamin Gomes		
	SIGNATURE		

TIME IS OF THE ESSENCE: carefully consider the facts, and discuss these issues with your family and friends. If you feel the same as I and others do then your reply must be mailed immediately. Further, I suggest you xerox this form for others to respond. We must have the majority of the population to make a difference.

Mahalo Nui Loa,

William F. Hachmeister

William Frederick Hachmeister
(ex System Sustain Engineer for Teledyne MicroElectronics on the NASA space shuttle and unmanned launch vehicles).

rec'd DBEDT 2:45p
OCT 25 1993

12-296

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

Ms. Margaret B. Callan
P.O. Box 326
Naalehu, HI 96772

Dear Ms. Callan:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

12-297

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

SEP. 30 1994

Mr. Benjamin Gomes
P.O. Box 125
Naalehu, HI 96772

Dear Mr. Gomes:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

SEP. 30 1994

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-299

Please halt DEIS & Prevent the Governor from obtaining a license for that "Palima Point" project and any other environmentally destructive Project. Thank you
Eleanor Cate
1807 Waianuenue
Hilo, Hi.

JOHN W.
GOV.
JEANNE K. SCH
DIR.
RICK E.
DEPUTY DIR.
TAKESHI YOSHI
DEPUTY DIR.

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

SEP. 30 1994

Ms. Eleanor Cate
1807 Waianuenue Ave.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Cate:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *Please halt the dEIS to prevent the Governor from obtaining a license for the "Palima Point" project and any other environmentally destructive projects.*

Response: The dEIS is based upon public concerns that were raised during the scoping process. The dEIS addressed those concerns in the context of a conceptual plan. Agencies and the public used the review period following the release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address the public and agency comments raised during the public review period. The State funded the EIS to disclose the potential impacts of building a spaceport, recognizing that some unresolved issues may require supplemental studies by a developer.

There is no specific project under consideration at this time. If an actual launch project for Palima Point is proposed at some time in the future, supplemental studies relating to the specific project under consideration would be paid for by the developer. If the project is constructed, (subject to applicable regulatory approval by the various state, local, and federal agencies) an operating license would be required from the U.S. Department of Transportation. The commercial operator of the facility would be the license applicant, not the Governor of Hawaii.

From Patrick Christiano
1504 Railroad Avenue
Hilo, HI 96720

To Governor, State of Hawaii
Mr. John Waihee
c/O Office of Environmental Quality Control
220 South King Street
Honolulu, HI 96813

Hilo, November 18, 1993

Dear Governor, John Waihee,

As a resident of the Big Island, I am concerned with the proposed 'SPACEPORT' in Kau. I protest the way the people of Hawaii are not being involved with this dangerous project. I certainly donot want it there, especially with any capacity to launch 'nuclear-fueled' vehicles. I was a resident of New York City many years ago when a Nuclear Naval Port was proposed for Staten Island and was very relieved that the project was never begun. I also helped protest the development of this Port and received much support from the residents of Staten Island, including one of the policemen who witnessed our protest and has a family there.

I would protest vigorously any continuation of the 'draft Environmental Impact Statement' and would work against any public or political figure who supports or allows the work on this statement to continue.

Let us keep Hawaii safe and Nuclear Free!

Thanks for your attention,

Yours sincerely,

Patrick Christiano

Patrick Christiano

Cc: Office of Environmental Quality Control
220 South King Street, 4th floor
Honolulu, HI 96813

Dep. of Business, Economic Development & Tourism
att: Mr. Tak Yoshihara, Deputy Director
PO Box 2359
Honolulu, HI 96804

12-301

JOHN WA
GOV
JEANNE K. SCH
DIR
RICK EC
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor Honolulu, Hawaii 96813
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SEP. 30 1994

Mr. Patrick Christiano
1504 Railroad Avenue
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Christiano:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Richard [illegible]

for Takeshi Yoshihara

Attachments

Comment: *I protest the way the people of Hawaii are not being involved with this dangerous project.*

Response: The people of Hawaii have been involved with this project since its inception. A total of five scoping meetings were held in September of 1989 to obtain a detailed list of public concerns. These concerns helped to define the scope of the EIS. A team of expert professionals managed by MCM Planning prepared the 10-volume, 1,200 page draft EIS in order to respond to issues raised by the public. The Office of Space Industry executive director gave dozens of informational briefings on the Big Island, in addition to attending several large public meetings. Newsletters discussing spaceport issues were distributed, and a video of a Vandenberg Air Force Base tour by local residents was produced to address local concerns. OSI prepared the Interim Project Description in June 1991 and the Conceptual Plan in 1993 and distributed them to the public. Meetings with legislators and other elected officials were held to answer questions raised by their constituents. EIS consultants contacted over 200 residents of the Big Island as well as representatives of federal, state, and county organizations.

12-302

Comment: *I certainly do not want the spaceport in Ka'u, expecially with any capacity to launch 'nuclear fueled' vehicles.*

Response: Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: *I would protest vigorously any continuation of the dEIS and would work against any public or political figure who supports or allows work on this statement to continue.*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for

citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address those public and agency comments raised during this public review period. Ninety-seven agencies and individuals took the time to review the document and write to the Department, it is only common courtesy to respond to their comments. The State funded the EIS to disclose the impacts of building a spaceport based on a conceptual plan. We believe the EIS serves this purpose, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

KKM

GOVERNOR/MAYORS OF:

John Waihee

RE: SPACE PORT IN KAU

THE HEALTH HAZARD SHOULD TAKE PRECEDENCE IN REGARDS TO PEOPLE. THE WEALTH OF THESE LANDS BELONGS TO THE PEOPLE, ESPECIALLY NA KANAKA MAOLI. POLLUTION REGARDLESS IN WHAT FORM, IT K I L L S - DEAD PEOPLE DON'T NEED JOBS.

DROP THE NOTION THAT THIS WILL SOLVE BIG ISLE PROBLEMS. BETWEEN MADAM PELE, THE SULPHUR,FROM THE GEO-PLANTS GAS FUMES. DO NOT ADD FUEL TO THE FIRE. I AM OPPOSE TO IT COMPLETELY.

A SIMULATED TRAINING, MUSEUM, TO EDUCATE THE YOUNGER, IS MORE THE WAY THE KANAKA MAOLI SHOULD GO. TO USE AS A PLACE TO VISIT AND LEARN WITH SPACE THE FINAL FONTIER, INTERJECTED.

PROMOTE THE CIVIL AIR PATROL CADETS, GET THEM INVOLVED. REMEMBER WE ARE AN ISLAND, NOT A CONTINENT_N O B L A S T-O F F FROM HAWAII: YOU ARE MORE HURT.TO INJURY,ALREADY OPPRESSING MY NA KANAKA MAOLI.

---- ~~CONERNED CONSERVATIVE~~ ----
UA MAU KE EA O KA AINA I KA PONO

12-303

Concerned Conservative
No Return Address

Comment: *Health hazards should take precedent over all else; pollution will kill people. The proposed Spaceport should not be built.*

Response: The Health Risk Assessment conducted for this project (DEIS Volume VIII) concluded that the risks for normal successful launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project.

Expanding the world of consciousness...

November 22, 1993
Department of Business, Economic Development and Tourism

Dear DBEDT:

This is a copy of what was sent to the Governor. Please read and take proper action on what's becoming its irreversible truth.

As anyone paying attention can see, it's become completely obvious that the majority of Hawaiians plus nearly every governmental body on the Big Island are strongly opposed to any sort of "Spaceport" on this island. Not only will such a project violate our statutes against nuclear-propelled vehicles in Hawaii, but the majority feels it will greatly damage our down-to-earth and natural image, an image that will sustain us (via agriculture and small businesses) into a healthy future. Thus it's certainly time to put an end to all EIS studies etc., and begin to use the money allotted for such to good use via support of small business growth on the Big Island. The people have spoken and spoken **resoundingly**. All Starwars/"Spaceport" feasibility studies must cease, and the sooner the better for us all. Let's get on with a healthy and environmentally sound future, as the people here will tolerate no less.

Most sincerely yours,

Jesse Aina Dawn
Editor/Publisher
World Changing Books

12-304

175 Banyan Drive - Suite 216 - Hilo, HI 96720 - Phone or Fax 808/934-7942

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN WA
GOVE
JEANNE K. SCHL
DIRE
RICK BO
DEPUTY DIRE
TAKESHI YOSHIH
DEPUTY DIRE

General Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Jesse Aina Dawn
Editor/Publisher
World Changing Books
175 Banyan Drive
Suite 216
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Dawn:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Vic[illegible] Date: 11-12-93

Name and address: Victoria Dawson
54 Waianuenue Avenue
Hilo, HI 96720

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-305

JOHN W.
GOV.
JEANNE K. SC
DIR
RICK E
DEPUTY DIR
TAKESHI YOSHI
DEPUTY DIR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu Hawaii 96813
Mailing Address P.O. Box 2359 Honolulu Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

Ms. Victoria Dawson
54 Waianuenue Ave.
Hilo, HI 96720

SEP. 30 1994

Dear Ms. Dawson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-306

SEND COPIES TO
APPROPRIATE PARTIES

POSTED

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

'93 NOV 16 P2:40

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

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I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Eleanore Duyndam Date: Nov. 12, 1993

Name and address: Eleanore Duyndam
36 Aloalo St.
Hilo, HI 96720

Cc: - Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

- State of Hawaii, OEQC
220 South King St., 4th fl.
Honolulu, HI 96813

c: Kenneth Munechika, DBEDT

12-307

JOHN W.
JEANNE K. SCH
RICK E
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu Hawaii 96813
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

Ms. Eleanore Duyndam
36 Aloalo St.
Hilo, HI 96720

Dear Ms. Duyndam:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I)

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-308

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spacepo[illegible]' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptanc[illegible] or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEM[illegible]T (DEIS) re above subject for the following reasons:

Insufficient disclosure to the [illegible]blic for their only formal comment concerning the natural environment [illegible]nd the human environment, with health hazards and risks that can [illegible] fatal, precisely the nuclear and chemical fuels.

I support the immediate and to[illegible] withdrawal from the DEIS process and do not authorize Governor John [illegible]aihee to continue with this project.

Yours sincerely,

Signature: Jean T. Ednie Date: 12/1/93

Name and address: Jean T. Ednie
78-6629 Alii Dr.
Kailua-Kona, HI 96740

Cc: Department of Business, Econ[illegible] Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Dep[illegible] Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office [illegible] Environmental Quality Control
220 South King St., 4th [illegible]or
Honolulu, Hawaii 96813

12-309

JOHN W.
GOV[illegible]
JEANNE K. SC[illegible]
DIR
RICK E.
DEPUTY DIR
TAKESHI YOSHI[illegible]
DEPUTY DIR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

Ms. Jean Ednie
78-6629 Alii Dr.
Kailua-Kona, HI 96740

Dear Ms. Ednie:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I)

SEP. 30 1994

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-310

September 20, 1993

Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Governor Waihee:

It is the concern of all people, animals, and plant life that abides on the Big Island of Hawaii, more precisely the Ka'u District, that I write this letter.

We of this area (and I am sure my views are shared by many concerned citizens) are privileged to share one of the rarities of our time, the wild, pristine qualities of nature that we are allowed to enjoy during our brief stay on planet Earth. We all must agree that as time goes by, more and more of this rarity is slipping away, being destroyed by man's greed and obvious short-sightedness of the future of our planet. We of the Big Island especially have a duty to guard and protect this gift from God and keep this area and all places on Earth protected from threats by unnatural practices that would destroy the very home we call planet Earth.

A spaceport in Ka'u is not acceptable if this area is to be kept pristine. It is not productive. It is nonconducive to the environment. No one wants it and no one needs it.

Sincerely,

John Elhärd

John Elhard
P.O. Box 6195
Captain Cook, HI 96704

12-311

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Centre Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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JOHN WA
GOVE
JEANNE K. SCH
DIRE
RICK EC
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

SEP. 30 1994

Mr. John Elhard
P.O. Box 6195
Captain Cook, HI 96704

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Elhard:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

1) KKM
2)
3)
4) BF/filing

September 19, 1993

Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Governor Waihee:

As I look out my window, twenty miles straight down, to the ocean, I see no one, no houses, no people, no man-made objects of any kind. I listen, and hear no humans or human-made sounds only the soft susurrus of a gentle wind. Today a misty fog is rolling up the mountain giving me an eerie, yet wonderful feeling, a feeling of remoteness, of being cocooned. I feel at peace. Once again I am awed by the grand, and yet subtle beauty of my home in Ka'u.

I am reminded of the contrast to parts of the world I have seen lately. Just trying to drive around Chicago can give me as much stress as six months in Ka'u! My friends in the Bay Area in California spend hours every day thinking about cars, and routes, and battling the myriad freeways, which seem to me to be scenes from a Science Fiction Movie!

Last summer, in Switzerland, I was amazed. Every inch is "civilized." All the crops grow in neat little rows, on the diagonal, in perfection. The air, even in the mountains, is polluted, as is the water. Most shocking were the camp grounds I saw from my train window, on a trip to the Matterhorn. The tents were jammed together with barely enough room to walk around them! There were five people per square inch!

It was a wonderful relief to be back in Ka'u, where I live in the "wilderness," but am perfectly comfortable and at home. Many of the people in this area feel as I do. We are happy to be out of the "electric grid." We have wind generators, and organic vegetable gardens. We are concerned about things like preserving native plant species. We feel happy and privileged to have our wonderful Volcano National Park, and the goddess Pele, practically in our backyard.

Please do everything you can to prevent this small remaining packet of "wilderness" being irrevocably spoiled and polluted by the proposed spaceport!! One has the feeling some rich people got together and said, "Let's put our big, smelly, ugly, noisy, polluting spaceport THERE--there's nothing there but a few trees and a desert!"

Please don't force this abomination on one of the last truly Hawaii places, Ka'u; one of the last truly wild places in the world!

Mahalo,

Kathleen Elhard

Kathleen Elhard
Post Office Box 6195
Captain Cook, HI 96704

"Gov. Group" FILE

Sunday
October 24, 1993

Dear Governor Waihee,

Our Kau church group recently held a letter writing campaign in opposition to the proposed Palima Point spaceport. My letter was published in both island newspapers. The response was heartening, everyone was sympathetic to our position. You, sir, were the the only official, including the president, who did not bother to respond. According to today's West Hawaii Today, you are apparently the only person in the Hawaiian Islands who still favors the project!

I am 45 years old, and have never voted for a Republican, principally because I thought Democrats represented the will of the people, as opposed to Big Business. On the Big Island, not even the Republicans want this project of yours! If you shove this turkey down our throats I guarantee I will never vote for you again, and neither will anyone else I know!

We all realize that having spent so much of our money on this project, you mus save face. However, the consensus of opinio is that the wise thing for you to do is back down gracefully. There are some pa ticularly apt pearls of wisdom that apply t this situation: "Why throw good money after bad?", "Why go down with a sinking ship?", and "Quit beating a dead horse!"

Alternatively, if you feel this spacepor is such a wonderful thing, put it in YOUR front yard instead of mine. See how it contributes to the quality of your life.

In closing, I suggest that you, a a native Hawaiian, contemplate how mu Madame Pele would like having this bi ugly, smelly thing next door to her home in Hale Mau Mau! If you think it w be embarrassing to back out now, just think what it would be like to build it, and have it covered with a lava flow!

Sincerely,
Kathleen Elhard
PO Box 6195
Oceanview, Hawaii 9

phone #(808) 929-9557

to Director, DDFT

12-313

JOHN WAIHEE
GOVERNOR
JEANNIE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Kathleen Elhard
P.O. Box 6195
Captain Cook, HI 96704

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Elhard:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-314

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November 20, 1993

John Waihee, Governor
State of Hawaii
c/o: Office of Environmental Quality Control
220 South King Street - 4th Floor
Honolulu, Hawaii 96813

Re: Conceptual Plan for a "Spaceport" at Palima Point.

Dear Governor Waihee:

I wish to register my protest against the acceptance or continuance of the Draft Environmental Impact Statement -- DEIS -- regarding the above mentioned spaceport.

I feel that the dangers inherent in this proposal far outweigh any economic or scientific achievements that could be possibly gained. And also I believe that these dangers are not being given their proper and due consideration.

I strongly recommend you to immediately and totally withdraw this conceptual plan for a commercial satellite launching facility at Palima Point.

Respectfully yours,

Dennis Gottschalk
55 Krotona Hill
Ojai, CA 93023

cc: Department of Business, Economic Development & Tourism
Attn: Mr. Tak Yoshihara, Deputy Director
Post Office Box 2359
Honolulu, HI 96804

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JOHN W.
GO
JEANNE K. SCH
DIR
RICK E
DEPUTY DIR
TAKESHI YOSHI
DEPUTY DIR

SEP. 30 1994

Mr. Dennis Gottschalk
55 Krotona Hill
Ojai, CA 93023

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Gottschalk:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *I wish to register my protest against the acceptance or continuance of the dEIS regarding the spaceport.*

Response: The dEIS is based upon public concerns that were raised during the scoping process. The dEIS addressed those concerns in the context of a conceptual plan. Agencies and the public used the review period following the release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address the public and agency comments raised during the public review period. The State funded the EIS to disclose the potential impacts of building a spaceport, recognizing that some unresolved issues may require supplemental studies by a developer.

There is no specific project under consideration at this time. If an actual launch project for Palima Point is proposed at some time in the future, supplemental studies relating to the specific project under consideration would be paid for by the developer.

12-316

Comment: *The dangers inherent in this proposal far outweigh any economic or scientific achievements that could be possibly gained. Also, these dangers are not being given their proper and due consideration.*

Response: Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The Health Risk Assessment conducted for this project (DEIS Volume VIII, Appendix A) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

REVIEW
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
AUGUST 16, 1993

THIS OVER ALL BRIEF REVIEW IS BASED ON VOLUMES 1 AND 2 OF THE PROPOSED SPACE PORT AT THE PALIMA POINT, HAWAI'I, AND NOT THE SUPPORTING 8 SUPPLEMENT VOLUMES OF THE DEIS.

CONSIDERING THE SPACE PORT IS EXTREMELY COMPLICATED AND HAZARDOUS. ARE THE DEPRECIATIVE RISKS RELATED TO: LAND, HEALTH, AND ENVIRONMENTAL ASPECTS WORTH A PROJECTED 7.7 MILLION DOLLAR A YEAR TAX REVENUE INCREASE? EVEN THOUGH THIS PROJECT OFFERS THE PROMISE OF A FEW HUNDRED SEMI-SKILLED JOBS, AND STIMULATING EXISTING BUSINESSES.

WE THE PEOPLE ARE ASKED TO GIVE PUBLIC STATEMENTS ON THE NEWLY RELEASED DEIS, WHICH IN FACT IS ONLY A GUIDE AND NEEDING FURTHER STUDY AND CLARIFICATION. NEVER THE LESS, THE DEIS DOCUMENT IS OF EXTREME IMPORTANCE SINCE, IT IS CAPABLE OF STARTING IRREVERSIBLE ACCEPTANCE OF THE PALIMA POINT SPACE PORT PROPOSAL.

MARILYN C. MERTZ (MCM) DEIS FINDINGS

SUMMARY PAGE S-1:

"THE DEIS IS PROGRAMMATIC IN SCOPE AND SHOULD BE CONSIDERED GUIDE TO STATE DECISION-MAKERS IN DETERMINING WHETHER OR NO RESOURCES SHOULD BE ALLOCATED TO SITE ACQUISITION, PERMITTING A FURTHER ANALYTICAL STUDIES RELATED TO THE COMMERCIAL SPACE LAUNC FACILITY INITIATIVE... THE APPLICATION FOR A SITE AND/OR OPERATOR LICENSE FROM THE OFFICE OF COMMERCIAL SPACE TRANSPORTATION (OCST WILL BE THE RESPONSIBILITY OF THE PRIVATE DEVELOPER AND/OR OPERATO AND NOT THE STATE ...FINALLY, A SUPPLEMENTAL EIS (POSSIBLY A JOIN FEDERAL/STATE DOCUMENT WILL BE PREPARED AT A LATER TIME WHEN A ACTUAL PROJECT IS IMMINENT."

MCM HAS PREPARED AN EXPANDED DOCUMENT CONCERNING HAZARDOU CHEMICALS THAT ARE USED IN BULK BY THIS PROJECT. THESE CHEMICAL ARE TOXIC, AND POSE A REAL HEALTH RISK THAT ON A PARTS PER MILLIO SCALE BECOME AN HEALTH HAZARD, OR LETHAL. THE CHEMICALS AR EXPLOSIVE AND HAVE CORROSIVE PROPERTIES, AND THEREFORE REQUIR EXPERIENCED, AND WELL TRAINED PROFESSIONALS DURING HANDLING TRANSPORTATION, AND CAREFUL CONSIDERATION OF CHEMICAL STORAGE THERE WILL BE NUMEROUS TIMES THESE CHEMICALS WILL BE TRANSPORTE FROM THE HILO HARBOR ON A HEAVILY USED PUBLIC HIGHWAY THAT AT TIME OF LONG DISTANCE IS ONLY A TWO LANE HIGHWAY, AND THE ONLY ROA SYSTEM AVAILABLE.

THE SPEED OF THE CONVOY WILL ALWAYS BE SLOW; TRAVELING THROUG CITY, TOWNS, AND ON THE OPEN HIGHWAY. THERE IS TO BE A HAZARDOU MATERIAL TEAM (HAZMAT) ESCORTING THESE TRIPS CAPABLE OF COVERIN

AND CLEANING-UP A SPILL IN 5-20 MINUTES. IMMEDIATE EVACUATION OF THREATEN POPULATED AREAS IN THE EVENT OF A SPILL IS JEOPARDIZED BY THE SINGLE HIGHWAY ACCESS. THE ONLY IMMEDIATE SOLUTION WOULD BE TO MOVE THE PUBLIC OUT OF THE DIRECTION OF A TOXIC CLOUD. IN THE EVENT OF TRAGEDY: RESCUE, AND EMERGENCY VEHICLES COULD BE BLOCKED BY DAMAGED VEHICLES. HELICOPTERS, AND ROUTING OF EMERGENCY VEHICLES FROM OTHER REMOTE LOCATIONS, WILL BE THE ONLY OPTION AVAILABLE WHEN THE HIGHWAY IS JAMMED.

OPTIONAL HARBORS:

MCM POINTS OUT THERE ARE UN-IMPROVED BARGE DOCKING AREAS CLOSE TO THE LAUNCH FACILITY. HOWEVER THEY COST MONEY TO IMPROVE, ESTIMATED COSTS: FIFTY PLUS MILLION DOLLARS. THIS NEEDS TO BE CONSIDERED IN FURTHER STUDIES.

SECURITY IN TRANSPORTING, STORAGE, OF CHEMICAL MATERIAL:

CERTAIN WORLD EVENTS ARE HOSTILE TO THE U.S.; TERRORISM SHOULD NOT BE RULED OUT, AND THIS TYPE OF TRAGIC CAUSE COULD BE THE WORST OF ALL AND NEEDS TO BE STUDIED IN DEPTH. FURTHER, THE HAZMAT TEAM COULD BE INVOLVED IN ANY INCIDENT RENDERING THEM UN ABLE TO COMPLETE THEIR DUTIES.

BEACH SECURITY WILL BE CONSTANT BETWEEN 6 PM AND 6 AM, AND PATROLLING THE SPACE PORT SITE. FOR SAFETY REASONS THE POPULATION CONTROL ZONE (PCZ) WILL BE CONTROLLED FROM 6 PM THE DAY BEFORE LAUNCH, AND FOR A SHORT PERIOD OF TIME AFTER LAUNCH. IF A LAUNCH IS HALTED THE BEACH AREA WILL REOPEN A FEW HOURS LATER.

HEALTH IMPACTS:

IN ANY EVENT THE POPULATION WILL EXPERIENCE MINOR TO SERIOU HEALTH PROBLEMS ARE WELL ESTABLISHED. SOME BEING LONG TERM O FATAL. HEALTH PROBLEMS INCLUDE CANCER, RESPIRATORY, ORGAN DAMAG (LIVER BEING THE HIGHEST), AND OTHER SERIOUS ILLNESS WERE COVERED TOXINS CAN BE BREATHED IN, INGESTED (EATEN), PASSED THROUGH TH SKIN, OR ACCUMULATED ON FUR, PLANT ETC.. THEREFORE PETTING YOU PET OR EATING FROM YOUR GARDEN CAN BE LIFE THREATENING, OR FATAL

VOLCANIC/FLOOD/EARTHQUAKE ACTIVITY:

THE LAUNCH PADS ARE IN HAZARD ZONE 1 (THE MOST HAZARDOUS ZON see exhibit a) WITH PROBABLE VOLCANIC ACTIVITY IN THE NEAR FUTURE THIS ENTIRE AREA IS EARTHQUAKE ACTIVE. A FAULT NAMED THE GREA CRACK (see enclosed maps exhibit b, and b1) RUNS DOWNWARD FROM TH TOP OF THE KILAUEA VOLCANO AND ENDS WITHIN 2 MILES OF THE LAUNC PADS, AND IS CAPABLE OF VOLCANIC ACTIVITY. THERE WOULD BE LITTL TIME FOR EVACUATION OF WORKERS AT THE LAUNCH SITE, AND NO TIME FO FUEL REMOVAL, OR LAUNCH VEHICLE AND PAYLOAD LAUNCH.

PROPELLANTS:

THE FUEL FARM (PEA) IS IN VOLCANIC HAZARD ZONE 3 (see exhibi c), AND CONSTRUCTED ON TOP OF THE HI ONAMOA GULCH. FURTHE COMPLICATING IS THIS AREA IS MAPPED AS A DRAINAGE AND FLOOD ZONE LESS THAN TWO MILES AWAY IS THE LAUNCH PAD, AND TWO MILES IN TH OTHER DIRECTION IS THE TOWN OF PAHALA. IN THE EVENT OF MASSIV FIRE, AND EXPLOSIONS AT THE FUEL FARM THERE WOULD BE DESTRUCTIO FOR MILES IN ALL DIRECTIONS.

THE MCM STUDY WAS WELL SUPPORTED BY SCIENTIFIC DOCUMENTATION, AND MAPS OF THE LAUNCH SITE. STUDIES OF WIND CONTAMINATIONS MOVEMENTS, NOISE LEVELS WERE LAID OUT IN A GOOD TECHNICAL MANNER. BLAST DAMAGE WAS CONSIDERED AND PRESSURES UP TO 1 psi ARE EXPECTED AND ARE OF CONCERN. THE HAZARDOUS CHEMICALS AND THEIR EFFECTS TO MAN, ANIMAL, PLANTS, AND OCEAN LIFE WAS TAKEN INTO CONSIDERATION. THE NATURAL HABITATS IN THE VOLCANO NATIONAL PARK IS COMPROMISED BY LIGHTS, AND NOISE THAT WILL CAUSE WILD LIFE TO MOVE. IT IS OBVIOUS THE ENVIRONMENT, AND WILD LIFE WILL ALSO BE ADVERSELY EFFECTED BY THE LAUNCH BUSINESS.

INFORMATION NOT COVERED BY MCM

HAWAI'I IS AN COMMERCIAL OPEN SYSTEM, THE STATE NEEDS TO BE IN STRICT CONTROL OF THIS PROJECT, AND THE OPERATION, SINCE IN 1991 THE UNITED NATIONS ADDRESSED INTERNATIONAL LIABILITY IN THE USE OF SPACE NUCLEAR POWER SOURCE. COMPENSATION WOULD BE JOINT AND SEVERALLY FOR THE REIMBURSEMENT OF SEARCH, RECOVERY, AND CLEAN-UP OF FAILED SPACE OBJECTS, AND CAUSING DAMAGE TO OTHER NATIONS. HAWAI'I CAN BECOME JOINTLY LIABLE FOR ANY FAILED LAUNCH. THE FEDERAL GOVERNMENT HAS SAID IT CAN USE THE SPACE PORT TO LAUNCH NUCLEAR AND HAZARDOUS WASTE DESPITE HAWAI'I'S STATE LAW PROHIBITING NUCLEAR MATERIAL.

THE FUTURE OF SPACE LAUNCH VEHICLES IS CHANGING RAPIDL NUCLEAR PROPULSION OF ROCKETS OF VARIOUS SIZE, INCLUDING PLANETAR MISSIONS, CAPABLE OF TRANSPORTING HUNDREDS OF TONS IS NOW REALITY THE RUSSIAN SPACE INDUSTRY HAS TWICE LAUNCHED THIS KIND OF ROCKET KNOWN AS TOPAZ 2, OR THERMIONICS. THE U.S. PURCHASED 2 OF THES NUCLEAR POWER SOURCES, AND WE ARE NOW IN ACCEPTANCE OF NUCLEA PROPULSION FOR OUR SPACE VEHICLE NEEDS. THERMIONICS MAKES TRAVE TIME MORE IDEAL, SINCE IT TAKES HALF THE TIME TO TRAVEL TO MARS THEREBY REDUCING THE CHANCE THE CREW COULD BE OVER COME BY SPAC RADIATION, AND BOREDOM. THE COST TO MAINTAIN THESE ROCKETS I CONSIDERABLY CHEAPER THAN THE CHEMICAL ONES THAT WE ARE USE TO, A THEY ARE RE-USEABLE FOR 15 YEARS.

FURTHER MCDONNELL DOUGLAS IS CURRENTLY TESTING A VERTICAL TA OFF AND LANDING (VTOL) ROCKET, KNOWN AS THE DELTA CLIPPER. SUSPECT THIS ROCKET WILL BE OUTFITTED WITH SPACE NUCLEAR REACTO IN THE FUTURE.

ETHICS:

I AM A FORMER EMPLOYEE OF TELEDYNE MICRO ELECTRONICS. IN 1986 I BLEW THE WHISTLE ON MY EMPLOYER FOR FALSE TEST PRACTICES OF COMPUTERS USED FOR CRITICAL FLIGHT RESPONSIBILITIES. WHILE AT TELEDYNE I WAS PRESENT AT MEETINGS WERE THE SUBJECT OF COMMERCIAL LAUNCH PROGRAMS WERE DISCUSSED, AND IN CERTAIN MEETINGS IT WAS EXPRESSED THAT COSTS COULD BE REDUCED IF RELIABILITY WAS ENDED AFTER RESEARCH AND DEVELOPMENT, AND THAT PRIVATE LAUNCH COMPANY'S WOULD NOT REQUIRE FAULT ISOLATION ON FAILED COMPUTERS, "SIMPLY REPLACE ANY FAILED COMPONENT." WHILE AT TELEDYNE I DISCOVER SIX MAJOR FAILURES IN TEST SOFTWARE DESIGN, OR ENGINEERING REQUIREMENTS, ANY OF WHICH WOULD CAUSE THE LAUNCH VEHICLE TO MALFUNCTION.

THE NEW YORK TIMES, APRIL 14, 1993 V142 pC3(N) pD4(L): PENTAGON'S CONTRACT BAN FOR TELEDYNE; RELAYS UNIT ADMITS TO FAKING TEST RESULTS. TELEDYNES' ADMISSION OF GUILT IN FALSE TESTING OF CRITICAL COMPUTER DEVICES IN THE MANNED/UNMANNED LAUNCH VEHICLES IS IN ITSELF CAUSE FOR DEEP CONCERN WITH USERS REAL GOALS AND QUALITY ASSURANCE. ONLY AFTER YEARS OF VIOLATIONS TELEDYNE WAS FINED MILLIONS OF DOLLARS, AND RECENTLY BANNED FROM PENTAGON CONTRACTS. THE QUESTION THAT CROSSES MANY MINDS IS WHY DID IT TAKE SO LONG, AND WHAT ELSE TELEDYNE GUILTY OF?

THE PATRIOT MISSILE SYSTEM DEFENSE WAS AN AIR DEFENSIVE FAILURE DURING THE PERSIAN GULF WAR. MARTIN MARIETTA CORP. MANUFACTURED THIS MISSILE SYSTEM, AND TELEDYNE SUPPLIED THE GUIDANCE PACKAGE THAT IS NOW KNOWN TO HAVE FAILED CAUSING INTERCEPTS OF ENEMY MISSILE IMPOSSIBLE. HUNDREDS OF AMERICAN SOLDER DIED WHEN AN ENEMY MISSILE ATTACKED THEIR BARRACKS, AND THE PATRIO MISSILE WAS LAUNCHED TO INTERCEPT AND DESTROY THE ATTACKER, BU FAILED ITS MISSION. FURTHER, MARTIN MARIETTA SUPPLIED THE EXTERNA TANK FOR THE NASA SHUTTLE LAUNCH SYSTEM, AND AGAIN TELEDYN SUPPLIED THE GUIDANCE AND LIQUID FUEL CONTROL PACKAGE. THE FAILUR OF THE SHUTTLE CHALLENGER CAUSING THE DEATH OF SEVEN CREW MEMBER IS ONE OF OUR NATIONS MOST TRAGIC EVENTS. THE FINAL ANALYSIS OF TH CHALLENGER FAILURE BY THE PRESIDENTIAL COMMISSION (ROGER' COMMISSION) IS DISPUTED WITH EVIDENCE THAT THE GUIDANCE AND LIQUI FUEL SYSTEM CAUSED THE MALFUNCTION, AND NOT THE SOLID ROCKE BOOSTER AS CLAIM BY THE ROGER'S COMMISSION. THESE TWO PROGRAMS WER UNDER THE DIRECTION OF MARTIN MARIETTA, AND THEY NEVER QUESTIONE TELEDYNES' ETHICS.

THE MANUFACTURES, OPERATORS, AND USERS OF THE SPACE PORT HAWAI'I HAVE TO BE REGULATED, SINCE THERE ARE TO MANY IMPORTA ISSUES LEFT UNANSWERED. NON-DISCLOSURE OF NEXT GENERATION SPA VEHICLES, AND THEIR TYPES OF FUELS IS OF IMPORTANCE TO THE GENER PUBLIC, AND WE SHOULD HAVE FULL KNOWLEDGE OF NUCLEAR MATERIA BEING USED AND LAUNCHED FROM OUR ISLAND, AND HAVE THE OPPORTUNI TO SAY NO TO EVENTS THAT CAN IRREVERSIBLY EFFECT OUR PROPERTY A LIVES.

ETHNIC VIOLATIONS INVOLVING NUCLEAR REACTORS:

IN 1989 AND 1990 SPACE SHUTTLES WERE ALLOWED TO BE LAUNCH CARRYING NUCLEAR POWER REACTORS. THE PEOPLE OF FLORIDA OBJECTE IN COURTROOM ACTION, ASKING THAT THESE LAUNCHINGS BE HALTED. I JOINED THIS LITIGATION AND GAVE INDEPTH TESTIMONY CONCERNING TELEDYNE AND THE MALFUNCTION OF THE SHUTTLE CHALLENGER. THE PENTAGON, AND THE JUSTICE DEPARTMENT HAD ALREADY RECEIVED PLEA OF GUILT FROM TELEDYNE EMPLOYEES CONCERNING DEFENSE FRAUD.

CONCLUSION:

I DO NOT FEEL THE 7.7 MILLION DOLLARS IN TAX REVENUES, NOR ARE THE NEW JOBS WORTH THE RISKS AND LOSES. EVEN MCM'S VIEWS ARE EXPRESSIVE IN A CONTINUED STUDY OF THE SPACE PORT INITIATIVE. THERE ARE NON DISCLOSURES OF TYPES OF LAUNCH VEHICLES NOW IN TEST AND WILL SOON BE MANUFACTURED. FURTHER, WHAT ARE THE REAL GOALS, MISSION, AND CONTRACTUAL AGREEMENTS THAT SUPPORT A SPACE PORT INITIATIVE. THE PROBLEM OF LIABILITY HAS TO BE ANSWERED BECAUSE HAWAI'I IS AN OPEN SYSTEM WITHOUT PROPER REPRESENTATION FROM MANUFACTURING TO OPERATIONS OF THE LAUNCH VEHICLES, AND HAWAI'I COULD BE LIABLE TO OTHERS IN THE EVENT OF FAILURE.

IF IN DEED THE LAUNCH VEHICLES DO BECOME NUCLEAR POWERED I STRONGLY BELIEVE THAT THE FUTURE OF REAL ESTATE ON THE ISLAND OF HAWAI'I WILL NOT EXPERIENCE A POSITIVE GROWTH, BUT AN IMMEDIATE NEGATIVE SPIRAL WILL OCCUR. IF NUCLEAR LAUNCHING DID COMMENCE THE VISITORS TO HAWAII WILL DECREASE. I AM CERTAIN THAT CONTINUING THIS PROJECT WITHOUT ABSOLUTE AGREEMENT THAT THE PROHIBITION OF NUCLEAR MATERIAL ON LAUNCH VEHICLES IS ACCEPTED BY ALL CONCERNED, INCLUDING THE U.S. GOVERNMENT; THE RESULT WILL BE THE SAME AS PAINTING A BULL'S EYE ON THE PROJECT AN SAYING ATTACK ME HERE.

William F. Hachmeister

WILLIAM FREDERICK HACHMEISTER

Christian Science Monitor Jan. 14, 199 P20

A Sensitive Import

THE United States' decision to buy an advanced version of the nuclear reactor the Soviet Union uses to power spy satellites represents a mixed blessing.

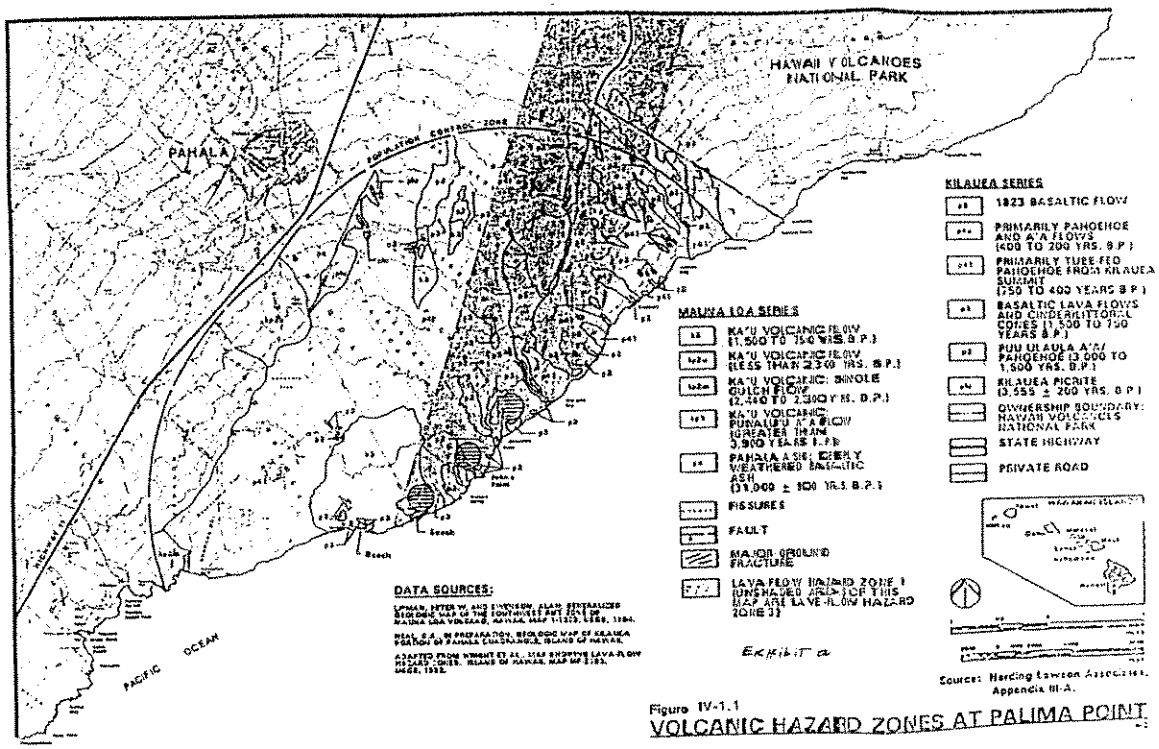
Soviet willingness to sell such sensitive technology is yet another welcome sign of a new era in Soviet-American relations, as well as a concession to the Soviets' need for hard cash. It also is a useful opportunity for US engineers to learn more about technology – especially high-tech materials – in which Soviet experts excel.

At the same time, the sale renews concern about use of reactors in space. A number of dead Soviet reactors already circle our planet, each loaded with extremely dangerous radioactive fission products. They are in nominally safe orbits and unlikely to crash to Earth, as did one spent reactor whose booster failed to push it into a parking orbit. Nevertheless, they are a nasty kind of space debris.

Nuclear propulsion may be appropriate for missions well away from Earth. It can be both powerful and efficient. But it should not be used in near-Earth orbits, as scientific groups in both the US and the Soviet Union have repeatedly stated.

The Soviet reactor is being imported for study, not for use in space. Its experimental use will be part of the ongoing research on nuclear space propulsion carried on by the Departments of Energy and Defense. The National Aeronautics and Space Administration, which has just reestablished its Office for Nuclear Propulsion, is also interested.

That seems fine, as far as research goes. But the Soviets have already tested the new reactor in space and continue to use reactor power sources on satellites. The United States should work harder to convince the Soviets to abandon this dangerous use of space nuclear power even while it studies the latest relevant Soviet technology with fascination.



Source: Harding Lawson Associates, Appendix III-A.

Figure IV-1.1
VOLCANIC HAZARD ZONES AT PALIMA POINT

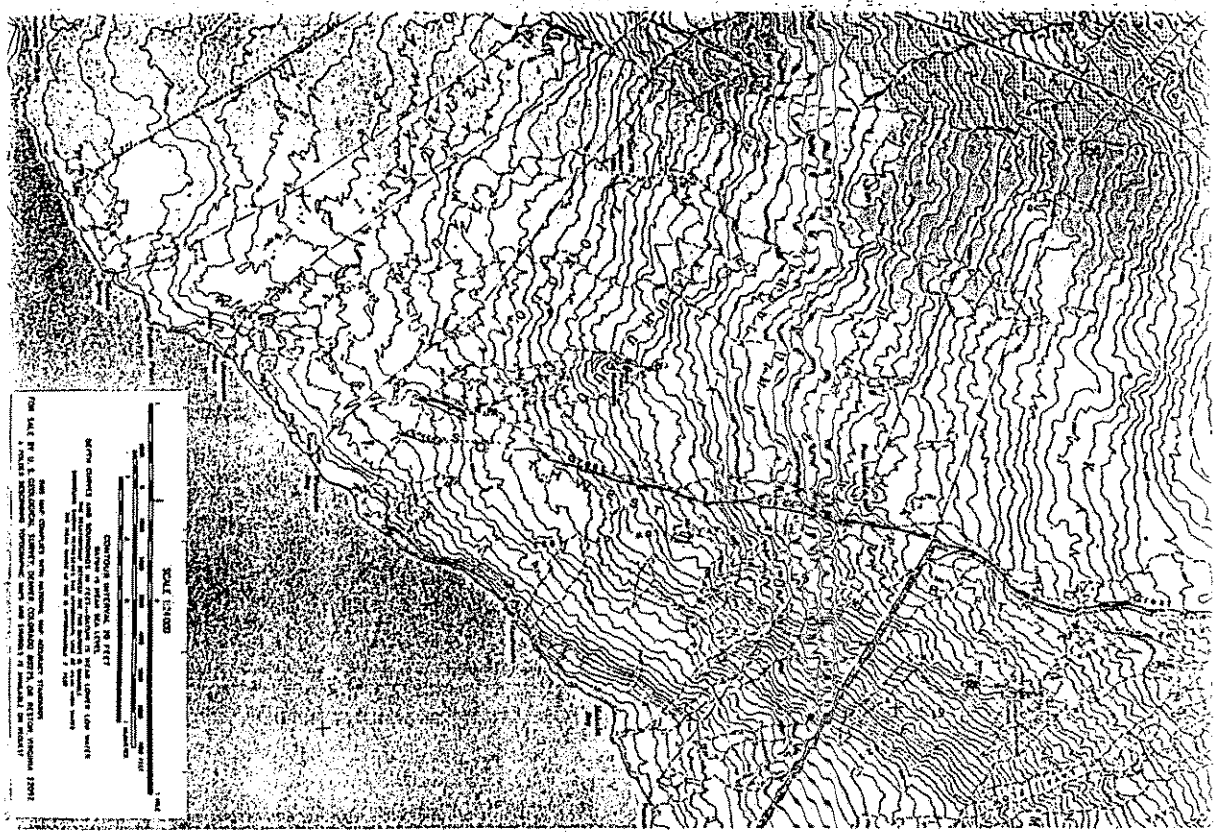
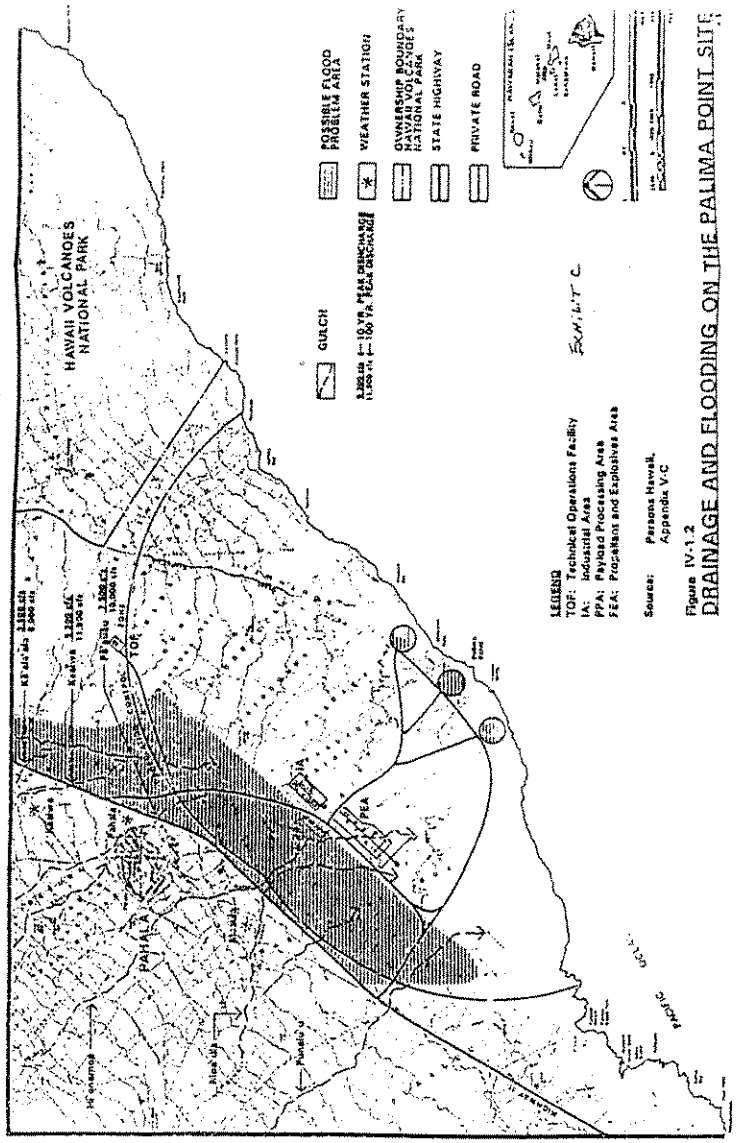
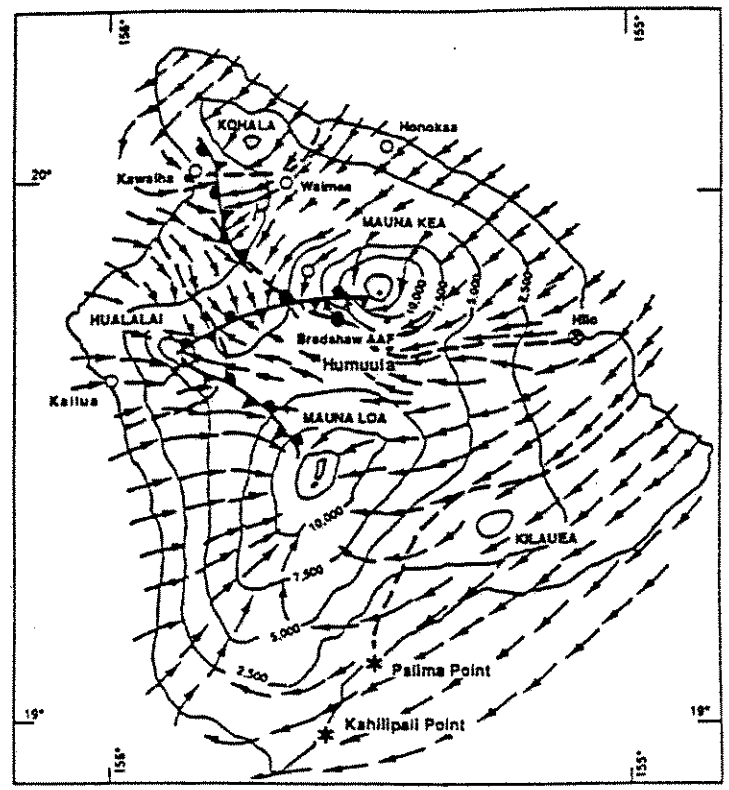


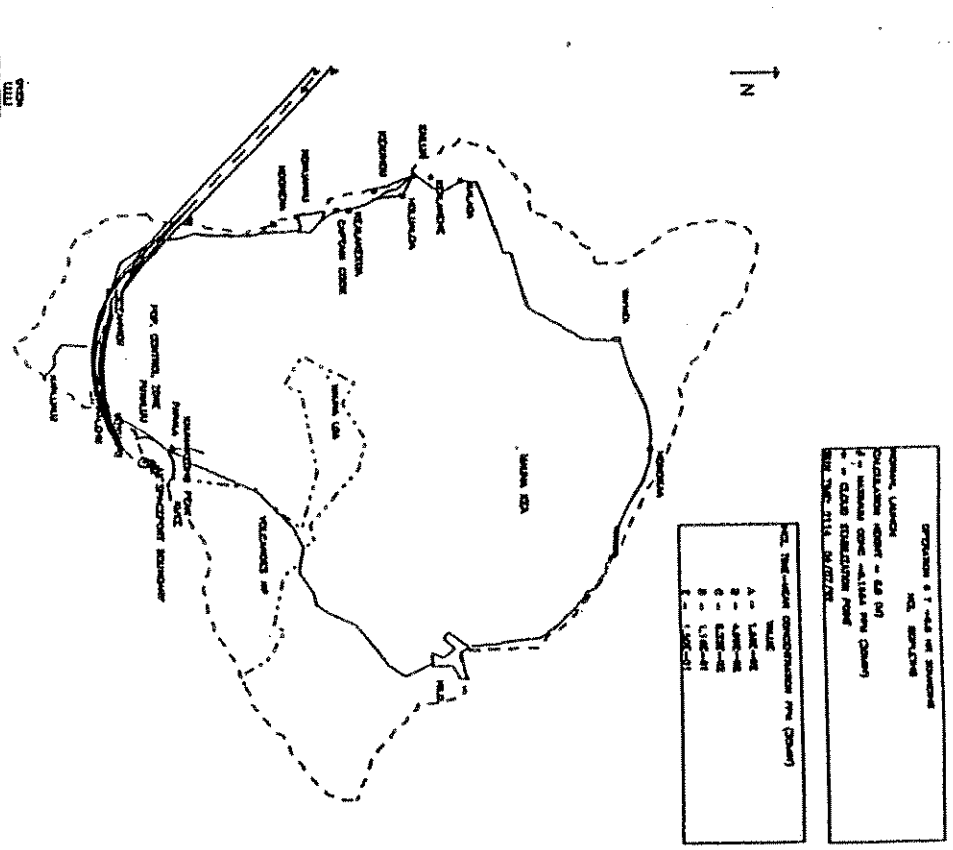
Exhibit b





Source: DBEDT, Office of Space Industry, 1993.

Figure III-1.4
ISLAND OF HAWAII:
DAYTIME TRADEWIND FLOW PATTERNS



Source: ACTA Inc., Appendix VI-D

Figure V-1.4
KONA WEATHER HCl ISOPLETH
(WINDFIELD SOLUTION)

Table 5.1.1 ACCEPTABLE EXPOSURE LEVELS (AELS) FOR ACUTE AND CHRONIC CANCER AND NONCANCER HEALTH EFFECTS

Substance	Mol. Weight	Acute Short-term 1 hour or less		Acute Short-term 1-24 hours		Chronic Noncancer Average Annual		Chronic Cancer	
	g/gmol	µg/m³	ppm	µg/m³	ppm	µg/m³	ppm	µg/m³	ppm
Aluminum Oxide (Al_2O_3)	101.94	15,000	3.6	---	---	500	0.12	---	---
Unsymmetrical-dimethylhydrazine (UDMH)	60.1	590	0.24	25	0.01	---	---	2	8.3E-04 (.00083)
Hydrazine (N_2H_4)	32.05	160	0.12	6.5	0.005	---	---	2.0E-04 (.0002)	1.6E-07* (.000016)
Nitrogen tetroxide (N_2O_4)	46.01	1,900	1.0	75	0.04			---	---
Formaldehyde dimethylhydrazone	72	590	0.20	25	0.01	---	---	2	8.3E-04 (.00083)
Dimethylnitrosoamine (DMNA)	74.08	160	0.05	6.5	0.0005			2.2E-04 (.00022)	7.2E-08** (.000072)
Hydrogen chloride (HCl)	36.47	5,000	3	7	0.0047	7	0.0047	---	---

Source: Risk Science Associates, Appendix VIII-A

g/gmol = grams per gram-mole
* 16 parts per 10 million

µg/m³ = micrograms per cubic meter
** 72 parts per 100 million

ppm = parts per million

Table 5.1.2 NONCANCER ACCEPTABLE EXPOSURE LEVELS (AELS) USED IN THE RISK ASSESSMENT

Substance	Acute Inhalation ($\mu g/m^3$)	Chronic Inhalation ($\mu g/m^3$)	Chronic Inhalation (mg/kg/day)*	Chronic Oral (mg/kg/day)*	Chronic Dermal (mg/kg/day)*
Unsymmetrical-dimethylhydrazine (UDMH)	5.90E+02 (590)	2.00E+00 (2)	5.71E-04 (.000571)	5.71E-04 (.000571)	5.71E-04 (.000571)
Hydrazine	1.60E+02 (160)	2.00E-04 (.0002)	5.71E-08 (.0000000571)	5.71E-08 (.0000000571)	5.71E-08 (.0000000571)
Nitrogen Dioxide (NO_2)	1.90E+03 (1900)	7.50E+01 (75)	2.14E-02 (.0214)	2.14E-02 (.0214)	2.14E-02 (.0214)
Formaldehyde dimethylhydrazone (FDH)	5.90E+02 (590)	2.00E+00 (2)	5.71E-04 (.000571)	5.71E-04 (.000571)	5.71E-04 (.000571)
Nitrosodimethylamine (DMNA)	1.60E+02 (160)	2.20E-04 (.00022)	6.29E-08 (.0000000629)	6.29E-08 (.0000000629)	6.29E-08 (.0000000629)
Hydrogen chloride (HCl)	5.00E+3 (5000)	7.00E+00 (7)	2.00E-03 (.002)	2.00E-03 (.002)	2.00E-03 (.002)

Source: Risk Science Associates, Appendix VIIIA.

* milligrams per kilogram (body weight) per day (24 hours).

12-325

DANIEL K. INOUYE
HAWAII

APPROPRIATIONS
Chairman, Subcommittee on Defense

COMMERCE, SCIENCE AND TRANSPORTATION
Chairman, Subcommittee on Communications

Chairman, SELECT COMMITTEE ON INDIAN AFFAIRS

Chairman, DEMOCRATIC STEERING COMMITTEE

Member, COMMITTEE ON RULES AND ADMINISTRATION

United States Senate
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FAX (202) 224-6747

PRINCE KUHIO FEDERAL BUILDING
ROOM 7325, 300 ALA MOANA BOULEVARD
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HILO, HI 96720
(808) 935-0844
FAX (808) 961-8162

August 10, 1993

Mr. William Fredrick Hachmeister
Post Office Box 10267
Hilo, Hawaii 96720

Dear Mr. Hachmeister:

On behalf of Senator Inouye, who is away from the office, I wish to acknowledge receiving your letter concerning H.R. 2200, the National Aeronautics and Space Administration Reauthorization for Fiscal Years 1994 and 1995. Thank you for taking the time to share your thoughts on this important measure with the Senator.

As you may know, the House of Representatives passed H.R. 2200 on July 29, 1993. The measure has been referred to the Senate Committee on Commerce, Science and Transportation. According to the Committee, no action on this measure is scheduled at this time.

Please be assured that I will bring your concerns to Senator Inouye's attention upon his return to the office.

Aloha,

Margaret L. Cummisky

MARGARET L. CUMMISKY
Senior Legislative Assistant

MLC:r

SPACE TECHNOLOGY

Delta Clipper Partners Set Goal For Single-Stage-to-Orbit Vehicle

EDWARD H. KOLCUM/WEST PALM BEACH, FLA.

McDonnell Douglas Space Systems Co. and its Delta Clipper partners have established an ambitious plan to prove the feasibility of a wingless single-stage-to-orbit (SSTO) vehicle that calls for a first demonstration flight 20 months from contract award.

The $58-million funding for the demonstrations comes from the Strategic Defense Initiative Organization (SDIO), but McDonnell Douglas views the vehicle as a payload carrier for science, commercial and a variety of other military missions as well.

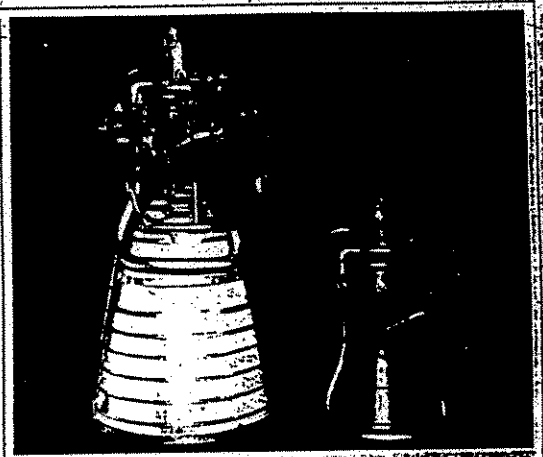
William A. Gaubatz, McDonnell Douglas program manager, said his company is committed to a first flight with a one-third scale model in April, 1993. A full-scale Delta Clipper is scheduled to make a first orbital flight by the late summer of 1996.

The program has matured rapidly during the past six months. SDIO awarded the Phase 2 contract to McDonnell Douglas last August for a vertical takeoff/vertical landing vehicle that resembles a giant fairing. In the Phase 1 design competition, Rockwell had proposed a vertical takeoff system that landed horizontally like the space shuttle; Boeing had a horizontal takeoff and landing concept, and General Dynamics a vertical/vertical design like that of McDonnell Douglas.

Phase 2 is to culminate in powered flight with a wingless vehicle called the DC-X Delta Clipper. A bare-bones site is being prepared in White Sands, N. M., for this first flight, which calls for the vehicle to take off, climb to about 500 ft., coast, demonstrate vehicle maneuvers, rotate, descend and come down tail first like the Project Apollo lunar excursion module. It will carry a parachute, but the landing is to be made with the same engines used for launch.

Pratt & Whitney is modifying four RL10 engines into an A-5 version that will be throttleable and have an extendable nozzle for low-altitude operations. The company is selling these engines to McDonnell Douglas for use in the Phase 2 DC-X program. The orbital demonstration program, called Phase 3, will use a full-scale 127-ft. spacecraft called DC-Y. The engine for the orbital vehicle has not been selected, but Gaubatz said McDonnell Douglas is considering proposals by Aerojet, General Electric and Pratt & Whitney.

James F. Holloway of P&W's Government Engines and Space Propulsion unit, said that, because of Atlas Centaur program delays, the company had a number of completed RL10 engines on hand. Thus, when Delta Clipper came on the scene, P&W was able to offer the RL10 engines with a new thrust chamber that can be used for sea-level operations and a throttling valve that will be able to vary power from 30% to 100%. This represents a thrust range of 4,384-14,764 lb. At the lower thrust rating, the specific impulse of the RL10A-5 would be 380.5 sec. and the chamber pressure 142 psia. The values for 100% thrust are 373 sec. specific impulse and 475 psia. chamber pressure.



RL10A-5 engine (right) that will power the DC-X Delta Clipper is a modification of the RL10-3A1 (left) that is standard in the Centaur upper stage.

USING EXISTING HARDWARE

Liftoff thrust will be 85% of maximum power, and the vehicle will land at a 15% power level. The crossrange capability is in excess of 1,600 naut. mi., which enables a return to the launch site even after only one orbit. The vehicle will use the Global Positioning System for navigation and guidance.

The A-5 engine has an area ratio of 4.28:1, a length of 42.1-in. and a weight of 316 lb. The conical nozzle will be optimized for low-level operations.

Design of the thrust chamber and turbine bypass valve was completed in November. The turbine bypass valve controls the throttle. The first thrust chamber is scheduled for delivery Nov. 1, and would enter testing July 15. Pratt & Whitney plans to build seven turbine bypass valves, delivering the first in April.

Following assembly and acceptance testing, all four engines are to be delivered by Nov. 1.

Holloway said it is only, because the programs involving Centaur experienced slippages that so much of the engine hardware was in inventory. For example, at the time McDonnell Douglas won the SDIO contract, the injector assembly, turbopumps, inlet valves, solenoid valves, and fuel control valves were in inventory. The oxidizer control valve and miscellaneous plumbing also were on hand but required some modifications. Only the fuel control valve and various other valves, actuators and controllers were in design or procurement, and the thrust chamber assembly was on order.

As a result, Holloway said, "this is a one-time good deal for somebody, and it happens to be McDonnell Douglas. This is not a normal delivery schedule that we could build and deliver an RL10 by any stretch of the imagination."

"There's another important point. We

COMMENTS ON
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY

TO: Governor, State of Hawaii
c/o Office of Environmental Quality
220 South King Street
Honolulu, Hawaii 96813

COPIES TO: Office of Environmental Quality
220 South King Street
Honolulu, Hawaii 96813

Department of Business, Economic Development & Tourism
Attn: Mr. Tak Yoshihara, Deputy Director
P. O. Box 2359
Honolulu, Hawaii 96804

FROM: William Frederick Hachmeister
P.O. Box 10267
Hilo, Hawaii 96720
(808) 961-5084

Sir:

All answers to comments from the public must be provided not only in English, but Hawaiian, Chinese, Japanese, as we well as Filipino (for these languages are prominent in the State of Hawaii), and both in: simple terms of understanding for the general public, and for the scientists, complete scientific language and methods of derived conclusion.

I, personally, and the people joining in these comments, do not believe further work on the Draft Environmental Impact Statement (dEIS) is necessary in order to reach the decision to cancel this project.

As stated by Marilynn C. Metz, representative of the MCM Planning company that produced the dEIS, the decision is now a political decision because the dEIS contains a sufficient basis for deciding to cancel the Spaceport without further refinement or expansion of the dEIS. See Appendix, Reference #1.

Based on the current dEIS, the Spaceport project should be canceled. Because no further study is needed to support this decision, the EIS process should also be terminated, rather than wasting millions of public dollars more on unnecessary work.

If state officials are unwilling to cancel this project and the EIS process now, then I request the following comments be considered in the EIS process.

page 2.

1. RELEASE OF RADIOACTIVE MATERIALS - The dEIS does not address the possibility that NASA will change its mind about using the proposed Palima Point facility for launches that incorporate radioactive materials.

Mr. Alvin Greenberg is the dEIS consultant for health and ecological risks. At the November 1 meeting of the Hawaii County Council, Council member Keiko Bonk-Ambramson raised the possibility that NASA might change its current position and decide to launch radioactive materials from Palima Point. Ms. Bonk-Abramson asked Mr. Greenberg whether his assessment of risk included the possibility that radioactive materials would be launched from Palima Point and, if not, whether the final EIS should include such an assessment. The Hawaiian law prohibiting such launches cannot prevent the federal government from deciding to proceed with use of the Palima Point facility for such launches.

Mr. Greenberg said the dEIS did not assess risks associated with radioactive launches but that it should, depending on the size of the payload and other factors. ** See Appendix, Reference #2. **

The final EIS should examine the radioactive payloads on previous and proposed NASA missions to determine the environmental impact on the island of Hawaii of such payloads being released through accident, natural catastrophe, or other means. **Further comments concerning nuclear pollutants in exhibits. **

page 3.

2. NATURAL DISASTERS -

A. Generally - Overall, The dEIS treatment of natural disasters is inadequate. At the November 1 hearing referenced above, Mr. Harry Kim, Civil Defense, County of Hawaii, stated: "I truly feel that the people who were responsible for addressing the issue of natural hazards on the area did a very incomplete job of understanding the magnitude of the hazards in that area. When I stated in Waikiki that I could not find or very few places on the islands, I should have said on the entire world that are more hazardous in regard to subsidence, earthquakes, hurricanes, and eruptions than this particular site." See Appendix, Reference #3. **

Mr. Kim's opinion is based on his knowledge of the vulnerability of this site to earthquakes, volcanoes, hurricanes, and cyclones. Examining the hazards as comprehensively as possible is necessary because the proposed site would contain stored chemicals, such as hydrozine, that are classified as extremely hazardous. The final EIS should contain a far more comprehensive survey of the natural disasters possible at the Palima Point site.

B. Earthquakes - The dEIS does not adequately address the potential destruction of the Palima Point facility by an earthquake. The effect of vertical shear, which could drop land 3 to 10 feet, is not adequately examined. The final EIS should look at the potential impact of all probable earthquake effects, including vertical shear.

C. Volcanoes - The dEIS assumes the Palima Point facilities could somehow be protected against lava flow. History shows such protection to be worthless. The final EIS should reflect actual experience, rather than some hypothetical "lava diverter."

D. Hurricanes and Cyclones - The dEIS does not adequately address the potential impact of hurricanes and cyclones in producing release of toxic and hazardous materials. The final EIS should include a comprehensive assessment of such risks.

3. ACCIDENTS - The operation of the Palima Point facility would require the transportation and storage of extremely hazardous materials. The November 1 hearing before the Hawaii County Council provided an interesting perspective on the issue of spill containment. Mr. Hudson (ACTA) testified that the only scenario he included for a hazardous materials team containing a spill was one in which the spill was contained within 15 minutes, the fastest possible time. When questioned as to why he had not included scenarios in which the team took longer, Mr. Hudson seemed to testify that the impacts within 15 minutes were so great that there was no need to look at worse cases. ** See Reference # 4. ** The final EIS should include the worst case scenarios, including a scenario in which the hazardous material team is itself a victim of the spill and other scenarios where there might be no containment possible, such as a spill caused by an earthquake preventing the hazardous materials team from reaching the site.

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4. ENDANGERED SPECIES - dEIS relied on a very limited study. The dEIS consultant did not contact known experts in various areas, such as endangered turtles. Possible impacts on all endangered, threatened, or potentially threatened species should be assessed in the final EIS, including a review of all existing studies to date on such species to determine whether adequate data even exists to make a determination.

5. AQUATIC IMPACTS - "by pollutants, such as aluminum oxide, released during rocket launches. The dEIS does not adequately address the circulation of water on the coast and, therefore, cannot assess the impact caused on the aquatic environment by pollutants released during rocket launches, such as aluminum oxide, or other pollutants reaching the aquatic environment from normal operation or accidental release at the facility. ** Enclosed are copies from Atlas of Hawaii, second edition. Exhibiting both water and air currents for the Island chain. Oddly enough, water current appears to return to the Island of Hawaii for both equatorial and polar launches. Therefore, a more in depth launch-caused pollution study of aquatic environment is needed for the EIS**.

6. IMPACT ON NATIONAL PARK/WORLD HERITAGE SITE - The dEIS does not contain information regarding actions taken to conform to obligations of the United States pursuant to "The Convention Concerning Protection of the World Cultural and Natural Heritage," a United Nations treaty to which the United States is a signatory. At the November 1 hearing, Mr. Hugo Huntzinger testified that the United States Park Service views the proposed facility as a threat to the Hawaii Volcanoes National Park, a designated world heritage site under the treaty. The final EIS should address what those treaty obligations are, how they will have to be met, and the possible impacts on the project of treaty obligations (including potential costs of mitigation required by the treaty).

7. OZONE DESTRUCTION - The dEIS does not address the potential contribution to ozone destruction from rocket launches at the Palima site. Launch rockets may use fuel that puts ozone destroying chemicals into the atmosphere. The possibility such fuels might be used and their potential impact on the ozone layer should be addressed in the final EIS.

8. ECOLOGICAL IMPACTS - Besides endangered species discussed in Comment 4 above, the DEISM fails to adequately address ecological impacts. A natural disaster in the presence of highly toxic materials could pollute the area for the life of the land. See Reference # 3 **. The final EIS should include the total ecological impact potential of this proposed facility in multiple worse case scenarios.

9. ASTRONOMY IMPACTS - The dEIS does not adequately address the potential for upper level winds to push the plume above 15 degrees on the horizon, obscuring telescopes located on the island. Mr. Bob Baxter, Engineering Science consultant on the DEISM, told the November 1 meeting that there was not enough data on upper level wind speeds and directions to answer this question. He estimated such a study would take one year and cost $500,000. Given climate destabilization already happening, as evidenced by the El Nino current failing to disappear this year as predicted by all climate models currently relied upon and by other aberrant weather across the world, even one year of study would not provide a reliable data base upon which to base a conclusion as to the effect of the facility on astronomy. The final EIS should be based on more comprehensive data and acknowledge the possibility that even the expanded data base is inadequate.

PREDICTING ATMOSPHERIC DEBRIS TRANSPORT IN REAL-TIME USING A TRAJECTORY FORECAST MODEL, from Atmospheric Environment Vol. 25A, No. 8. pp. 1705-1713, 1991. The Island of Hawaii has various wind shifts that have to be studied as to acid rain effects, and the potential of nuclear fallout caused by rocket launch vehicle pollutants. Each wind pattern must be examined, and complete data analyzed for the protection of the environment. November 22, 1993, The Honolulu Advertiser, page A1, "VA doctors desperately hunting clues to gulf sickness" (see supportive documentation exhibit), is an alarming article concerning military service people seeking the answer as to why they are seriously ill, and why some have off-spring suffering from mutagenicity (previous newspaper articles). Is it contamination from ammonia and fertilizer plants that is causing these illnesses? Complete analysis must be performed, by all methods, in an industry that produces pollutants such as rocket launches.

My personal efforts to raise questions in Washington, D.C., Bills HR-2200 and HR2491, were only accepted in writing, and not in-person testimony. In all fairness to the public, the State of Hawaii must now answer all my comments in this process, with supportive documentation as well.

10. ECONOMIC IMPACTS - At the November 1 hearing, Bruce Plasch, consultant on economic impacts, said his study of economic impacts did not address environmental impacts. ** Appendix reference #5 **. While there are still some people on this planet who believe whatever is done to the ecological systems is irrelevant to making economic decisions, the vast majority of mature decision-makers have acknowledged a need to connect ecological impact to economic decisions. The final EIS should examine the ecological impacts possible from the Palima Point facility's construction and operations, as well as natural disaster and accident scenarios, to determine the economic impact of such ecological impacts. Given the assessment by Mr. Kim of the potential natural disasters and chemical hazards at this site, a worst case scenario might well see the entire economy of the island destroyed. To divorce an economic impact analysis from this potential ecological result provides an artificial and incomplete result. See enclosures nuclear power plant studies.

An example:
A launch vehicle carrying nuclear fuel is not the same as nuclear power plant!
NUCLEAR PROPULSION MAY WELL POLLUTE MORE PER LAUNCH THAN A POWER PLANT.
Nuclear power plants are limited to 500 millirems a year in nuclear release.
Nuclear power plants and the value of agricultural land.
Land economics, Feb. 1991 v67 n1 p30(7).
Author: Sherman T. Folland and Robbin R. Hough
Abstract: Two studies of the effect of nuclear power plants on the value of land assets located, Nelson (1981) and Gamble and Downing (1982), found no consistent, significant effects of nuclear power plant proximity on land values. However, the external effects may become significant when extended over a larger geographical area than investigated in the previous studies. A study of the effect of nuclear power plants on the value of agricultural land in 494 regions constituting the US was conducted. The research tested a reduced form equation of the average price of an acre of agricultural land in proximity to a nuclear reactor against dummy variables. Research results indicate a significant negative effect on the value of agricultural land by the proximity of a nuclear plant, which increases with the age of the plant.

Subjects: Real property - Valuation, Nuclear power plants - Economic aspects, Farm - Valuation, Land use - Research.
HOWEVER, BOTH TOTALLY DESTROY PROPERTY VALUES IN THE EVENT OF NUCLEAR FAILURE.

11. CULTURAL AND SOCIOLOGICAL IMPACTS - ** This area is the one in which Ms. Bonk-Abramson said she had the greatest concerns. I assume she is preparing some comprehensive statement on these issues. We "incorporate by reference the comments of Keiko Bonk-Abramson (or whoever is signing them) on the inadequate treatment of cultural and sociological impacts."

12. Videotape Spaceport - Benefit or Tragedy (Hawaii County Council meetings), by W. F. Hachmeister, and script are enclosed. I strongly believe people from around the world are supportive of efforts to stop polluting our planet, and certainly pollution by nuclear contaminations. The hard work and study that the Hawaii County Council performed on the Spaceport proposal validated to the public the concerns regarding the risks and hazards. The County Council's vote 9-0 recommending cancellation of the project and the EIS process represents an informed decision that should be respected. Further, I believe tourism may be effected by boycotts from those choosing a vacation spot in support of banning space nuclear power sources, if the conceptual project continues. I further believe, Governor John Waihee should, by all means, withdraw the spaceport proposal by Nov. 22, 1993, and address the issues presented by the Hawaii County Council. The Governor would then become a member of a clearly courageous group of people whose acts will find their place in history. Remember the famous words of Abraham Lincoln: You can fool some of the people all the time, all the people some of the time, but you can not fool all the people all the time.

Concerning the Final EIS. The cost of further study and answers to the publics comments must be paid for by the people of Hawaii, and <u>not</u> an aerospace consortium or private venture. Whoever pays the piper calls the tune. While further expenditures on the EIS would be money wasted, if public officials are determined to waste resources simply to develop still further evidence to support cancellation of this project, then they should at least guarantee public control of the further study.

They should also be prepared to explain to the public why they wasted such resources when the project is finally canceled.

The videotape: Spaceport - Benefit or tragedy is clear, those in authority must provide answers and truth to the important and pertinent questions formally to the people concerning aerospace. I respectfully submit that a moment of silent prayer (<u>nationally, and hopefully international</u>), sponsored by the great State of Hawaiia, and statement of apology be given to those who have needlessly suffered from our pollution abuses, certainly to those who have died from genetic toxicity, and to those who live with mutagenicity.

Never forget the NASA Space Shuttle Challenger malfunction, and the need to formally determine the cause of death to the seven astronauts and many others, including Hawaii's own favored son astronaut Ellison Onizuka.

page 10.

CONSTITUTIONAL REQUIREMENTS: Article IX, Sections 1 of the Constitution of Hawai'i states: "For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources, including land, water, air, minerals, and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State. All public natural resources are held in trust by the State for the benefit of the people." The dEIS should examine the identified environmental impacts of the proposed satellite launching facility to determine whether such a facility can be constructed and operated without violating the foregoing constitutional protection of Hawaiian natural resources. Article IX, Section 9 states, in part: "Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources." The dEIS should examine the identified environmental impacts of the proposed facility to determine whether such a facility can be constructed and operated without violating the foregoing constitutional protection of the environmental rights of each person on the island of Hawaii. Just as regulatory constraints and legislative constraints are appropriate matters for an environmental impact statement to address, so are the constitutional requirements placed into law by the people of Hawaii on November 7, 1978.

Comment #13
Governor John Waihee refused to meet with me, as of the morning of November 22, 1993, concerning the comments of the dEIS I have expressed. Further, the connection between my family issue and the State of Hawaii as expressed in the document "To Whom It May Concern, in the Treatise section of this comment materials must be resolved".

Sincerely,

William Frederick Hachmeister

Lanny A. Sinkin, for Mr. Sinkin William F. Hachmeister.

** Missing dialogue: On Nov. 2, 1993 I requested for the County Council audiotape recording of the Nov. 1, 1993 Sub-committee meeting, and I supplied blank tapes for my copies. Finally on Nov. 16, 1993 copies of the sub-committee's tapes were supplied to me. My final corrections and inserts will be provided by Dec. 1, 1993, and I request at that time this comment document be up-dated if needed.

12-331

APPENDIX TO

COMMENTS ON
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY

PREPARED BY:

WILLIAM FREDERICK HACHMEISTER

Lanny A. Sinkin

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
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SEP. 30 1994

Mr. William F. Hachmeister
P.O. Box 10267
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Hachmeister:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-334

ACTA Inc., Dr. Richard Brock, Decision Analysts Hawaii, Inc., Engineering-Science, Inc., and Risk Science Associates contributed to the preparation of the following responses:

Comment: *Immediate evacuation of threatened populated areas in the event of a spill is jeopardized by the single highway access. The only immediate solution would be to move the public out of the direction of the toxic cloud. In the event of tragedy, rescue and emergency vehicles could be blocked by damaged vehicles. Helicopters, and routing of emergency vehicles from other remote locations will be the only option available when the highway is jammed.*

Response: In the event that a surface evacuation route is blocked, then helicopter evacuation would be necessary if people were considered to be in danger. This type of circumstance needs to be considered by local civil defense units and coordinated with the local fire, police and other relevant emergency service groups. If the project were to proceed, then emergency response plans must consider such contingencies.

The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (page 3-2 of Appendix VIA prepared by ACTA and page 5-54 of Volume I). According to ACTA, "*the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test.*" ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than one drum or one cylinder per truck accident is considered to be unlikely.

In over thirty years of transporting rocket fuels from the Mississippi River to Vandenberg Air Force Base, ACTA is aware of only a few instances where a release to the environment occurred. ACTA is not aware of any accident where more than one container was breached. Vandenberg Air Force Base receives many rocket fuel shipments each year from the Mississippi River and considerably more in both quantity and volume than would likely be transported within Hawaii. These shipments are highly controlled as regard to the route, hazmat teams, time of day, transporting vehicle speed, etc. Experience, therefore, does not suggest that the breach of more than one container is a reasonable and realistic. ACTA is not aware of even the breach of one 55-gallon drum of hydrazine in a transportation accident in over 30 years of operation of U.S. launch facilities.

Comment: *There are unimproved barge docking areas close to the launch facility. However, they cost money to improve--estimated cost $50 million. This needs to be considered in further studies.*

Response: If an actual project is planned, it is likely the developers would explore alternative transportation methods, particularly if toxic liquid propellants are involved. Supplemental studies would be the responsibility of the developer.

Comment: *Certain world events are hostile to the U.S., terrorism should not be ruled out, and this type of tragic cause could be the worst of all and needs to be studied in depth. Further, the Hazmat team could be involved in any incident rendering them unable to complete their duties.*

Response: Any public facility is a potential target for terrorist acts. Likewise, other vehicles that haul flammable or explosive materials such as propane, gasoline, or methane, pose potential dangers to the public stemming from terrorist acts or transportation accidents. Precautionary measures can be taken to prevent terrorist-related events from occurring. For example, the transportation vehicles or rocket motor containers could be hardened to prevent bullets from penetrating the containers. Access to and within the spaceport would be controlled according to the level of danger involved. For example, visitors would be allowed to access the beach or other common areas, however, the propellant storage areas and other sensitive facilities would be closed to all unauthorized persons. The procedures that Vandenberg Air Force Base uses to control and counter such potential acts could possibly serve as a model for the developers of the facility, are attached.

Appendix VIA discusses the potential impacts resulting from the ignition of a solid rocket motor as a result of a bullet piercing the casing. Once the motor is ignited it would be difficult to extinguish until the propellant is depleted. Unlike liquid propellants, the solid motors would not require the presence of a HAZMAT team during transportation.

The liquid propellants are very flammable and also would most likely burn if their containers were to be pierced by a bullet. Ignited liquid propellants do not pose a toxic hazard, rather, the thermal energy from resulting fire or explosion would pose the greatest concern. This is true of incidents occurring on-site, as well. An explosion causing the propellants to react could result in a "hot spill" as described on page 5-127 of Volume I. Reacted hypergolic propellants do not pose a toxic hazard, however, the fires could be a hazard to people and property. Fire damage would be expected in the event of catastrophic lava inundation and site destruction, with or without the involvement of combustible fuels.

Thus, from a toxic gas point-of-view, any explosion and ensuing fire will tend to reduce the quantity of material dispersed to the atmosphere and likewise reduce the quantity of

materials deposited at off-site locations. It is likely that given the quantities of materials maintained on-site at any one time, the potential for toxic exposure to off-site populations from any conceivable scenario of this nature will be of less consequence than those discussed in the transportation study.

Given the distances from the site boundary, and the likely on-site location of fuels, the blast hazard caused by ignition of on-site fuels will be of lesser consequence than that discussed for blast scenarios elsewhere in the dEIS.

Comment: *The population will experience minor to serious health problems--[the facts] are well established--some being long term or fatal. Health problems include cancer, respiratory, organ damage (liver being the highest), and other serious illness[es] were covered. Toxins can be breathed in, ingested, passed through the skin, or accumulated on fur, plant[s], etc. Therefore, petting your pet or eating from your garden can be life threatening or fatal.*

Response: Those substances which are emitted as particulates from launch vehicles can deposit on fruits and vegetables grown in backyard gardens. This potential exposure pathway is quantitatively evaluated in this response for emissions of aluminum oxide during normal launch and conflagration events. It is assumed that 10% of vine crops ingested on a yearly basis are from backyard gardens, that backyard fruits and vegetables are not washed or peeled before eating, and that release and deposition occur 20 hours per year in all scenarios. This is an overestimate for the conflagration scenarios which will occur less frequently. The results for vine crop concentration are used to obtain the dose via ingestion of contaminated produce:

$$C_f = \frac{Dep \times IF}{k \times Y} \times (1 - \exp(-kT)) \times \frac{20 \text{ hours/year}}{8760 \text{ hours/year}}$$

where

C_f = average concentration in and on exposed vegetation, $\mu g/kg$

Dep = deposition on the affected vegetation per day, $\mu g/m^2/day$

where

Dep = GLC x Dep Rate x 86,400

GLC = ground level concentration, $\mu g/m^3$

Dep Rate	=	rate of deposition for uncontrolled sources, 0.05 m/sec
86,400	=	conversion factor (sec/day)
IF	=	interception fraction, 0.1 for vine crops
k	=	weathering constant, 0.693/14 days
Y	=	crop yield, 2 kg/m^2
T	=	growth period, 90 days

Exposure dose, assuming 100% gastrointestinal absorption, is determined according to:

$$\text{Intake} = \frac{C_f \times I_f \times GI \times L}{ABW \times 1000}$$

where

Intake	=	exposure intake through ingestion of vine crops, mg/kg/day
C_f	=	chemical concentration in vegetation, μg/kg
I_f	=	consumption of vine crops, 0.25 kg/day
GI	=	gastrointestinal absorption factor, 1.0
L	=	fraction of vine crops homegrown, 0.1
ABW	=	average body weight, 70 kg
1000	=	conversion factor, μg/mg

Noncancer hazard index is determined in Table 1 by dividing the dose estimated by the oral acceptable exposure level for aluminum oxide, 0.14 mg/kg/day. The results obtained for the three launch scenarios in which aluminum oxide would be released (normal launch, on-pad conflagration, and ascent conflagration) are listed below.

	HAZARD INDEX
Normal launch	0.029
On-pad conflagration	0.019
Ascent conflagration	0.14

A hazard index of less than one is considered to represent no hazard. All hazard indices determined under this scenario are less than one and thus this potential exposure scenario does not present a hazard to people living or working in the area.

Dermal absorption of emitted substances deposited to soil is evaluated in the human health risk assessment contained in Appendix VIIIA of the dEIS. The maximum dose estimated due to dermal absorption of aluminum oxide emitted during a normal launch is 0.013 mg/kg/day at Punaluu Condos (Table 7-11). Dividing by the acceptable exposure level of 0.14 mg/kg/day results in a hazard index of 0.093. The maximum dose estimated during an on-pad conflagration is 3.5×10^{-6} mg/kg/day at Oceanview Estates School (Table 8-10). The corresponding hazard index is 2.5×10^{-5}. The maximum chronic dermal absorption dose due to release of aluminum oxide during conflagration of an ascending vehicle at 10 seconds after liftoff (Table 8-27) is 2.64×10^{-5} mg/kg/day at Pahala Preschool and Ka'u Hospital; the corresponding hazard index is 1.9×10^{-4}. A hazard index of less than one is considered to represent no hazard. All hazard indices determined under this scenario are less than one and thus this potential exposure scenario does not present a significant risk.

It is true that particulate substances emitted during launch activities and deposited to soil and plant surfaces may rub off onto pet fur as the pets roll in exposed soil or plants. Humans may subsequently rub these particulate substances from the fur onto their hands or legs when they pet the animals. It does not seem likely, however, that this potential dermal exposure pathway will significantly exceed dermal absorption directly from contact with contaminated soil. In any event, the noncancer hazard indices determined for dermal exposure to contaminated soil are so much lower than 1.0 that contribution of this additional dermal exposure pathway will not significantly raise the hazard indices. For it to do so, the dose via contact with pets would have to be 10,000 to 1,000,000 times the dose via direct contact with the soil. This hardly seems possible.

Comment: *The launch pads are located in Hazard Zone 1 with probable volcanic activity in the near future. There would be little time for evacuation of workers at the launch site [in the event of volcanic activity] and no time for fuel removal, or launch vehicle and payload launch propellants.*

Response: If an eruption were known to be imminent, or underway, some hazardous items could be removed before being overrun by lava. Such eruption prediction or forecasting has been successfully implemented by monitoring magma movements using seismicity data (and listening for volcanic tremor, etc.)

The dEIS implicitly recognizes that lava inundation would result in catastrophic destruction of the launch facility. Such occurrence would effectively shut down the launch facility permanently. As stated in the dEIS, Volume II, page 8-4:

> *"If the lower Southwest Rift Zone of Kilauea should erupt, however, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."*

Detailed descriptions of specific possible losses to permanent facilities, therefore, such as destruction of propellant storage tanks, launch towers, and so forth, are deemed unnecessary in the dEIS.

The toxic effects of chemicals inundated by lava that may pose a threat to the environment and people are expected to be less than the "cold spill" scenarios covered in the dEIS. As stated on page 5-128 of Volume I,

> *"Generally, spills involving unreacted hypergolic propellants pose the greatest hazard because the minimum vapor concentrations with toxic impacts are much below those required to sustain a flame. This means the size of a toxic cloud is potentially much greater than that of a flammable cloud. For equal amounts of released propellants, therefore, the potential for toxic impacts is greater [for a cold spill] than for fire."*

The thermal energy in lava would ignite the propellants and cause them to react, resulting in a "hot spill" as described on page 5-127 of Volume I. Reacted hypergolic propellants do not pose a toxic hazard, but the fires could be a hazard to people and property. Nonetheless, fire damage would be expected in the event of catastrophic lava inundation and site destruction, with or without the involvement of combustible fuels.

Comment: *The fuel farm (PEA) is in volcanic Hazard Zone 3, further complicating is this area is mapped as a drainage and flood zone. Less than two miles away is the launch pad, and less than two miles away in the other direction is the town of Pahala. In the event of a massive fire and explosions at the fuel farm there would be destruction for miles in all directions.*

Response: This is a valid concern. Brush fires are certainly an acknowledged risk at Vandenberg Air Force Base. As far as the Palima spaceport is concerned, any hazardous material stored on the facility must be protected in such a way that fire will not lead to burning or explosion of propellants and the introduction of toxic materials into the environment. Mitigations of this hazard include: (1) clearing of all brush some distance away from any storage area; (2) making storage areas resistant to any local fires; and (3) inclusion of adequate fire suppression equipment and procedures. The dEIS is based on a conceptual plan. If an actual project were planned, the PEA would probably be relocated.

Comment: *The State needs to strictly control this project and the operation. In 1991 the UN addressed international liability in the use of space nuclear power source. Compensation would be joint and severally for the reimbursement of search, recovery, and clean-up of failed space objects, and causing damage to other nations.*

Response: As you state in your letter, the State should indeed strictly control the development and operation of the proposed launch facility, although a liability problem due to nuclear failure would not be an issue with this facility because nuclear fuels would not be used. In any case, the method of achieving strict controls is discussed in considerable detail in the DEIS, Appendix XE (the State Spaceport Management Plan).

One of the principles which guided the development of recommendations in the Management Plan is: *"Identify clearly the responsibilities and obligations of the companies and government agencies, and provide them with sufficient powers to allow them to meet these responsibilities, thereby creating a structure wherein responsible parties can be held accountable for their actions."* Liability is addressed on p. 50 of the Management Plan. The controls would be accomplished primarily through two legal documents: (1) Leases and (2) Operating and Site Development Agreements. These two documents are outlined in the Management Plan.

Comment: *Hawaii can become jointly liable for any failed launch.*

Response: Liability and insurance would be addressed in the Operating and Site Development Agreement (OSDA) that the State would negotiate with the launch companies that form the Consortium. An outline for the text of an OSDA (in the DEIS, Appendix XE) shows a section called *"General Terms: Indemnification and Insurance."* In this section, the launch companies would agree to indemnify and defend the state and the county—a standard clause in all State contracts. They would also agree to assume the risk and pay damages from accidents, including those which injure others or cause damage to personal property. The companies could, in turn, purchase insurance to cover this potential eventuality.

Even though the State chooses to be self-insured it would still be able to protect itself from being liable to the launch companies for natural disasters originating outside the PCZ boundary by changing the Management Plan (Appendix XE referenced above) to specifically indicate that the State would not be liable to the launch companies or the Consortium for natural disasters such as fires, earthquakes, or lava flows, within or outside the Population Control Zone.

Comment: *The federal government has said it can use the spaceport to launch nuclear and hazardous waste despite Hawaii state law prohibiting nuclear material.*

Response: We know of no instance where any representative of the federal government has made the above statement. Although it is possible that the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: *The future of space launch vehicles is changing rapidly. Nuclear propulsion of rockets of various size, including planetary missions, capable of transporting hundreds of tons is now reality. The Russian space industry has twice launched this kind of rocket, known as Topaz 2, or thermionics. The U.S. purchased two of these nuclear power sources, and we are now in acceptance of nuclear propulsion for our space vehicle needs. Thermionics makes travel time more ideal, since it takes half the time to travel to Mars, thereby reducing the chance the crew could be overcome by radiation or boredom. The cost to maintain these rockets is considerably cheaper than the chemical ones that we are used to, and the are re-usable for 15 years. Further, McDonnell Douglas is currently testing a vertical take off and landing (VTOL) rocket, known as the Delta Clipper. I suspect this rocket will be outfitted with space nuclear reactors in the future.*

Response: Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched at Palima Point.

If a specific project is planned for the future, supplemental analyses would be performed for the specific project and its vehicle(s). DBEDT and the preparers of the dEIS are not aware of any rockets that use nuclear power to replace chemical propulsion systems except for the deep space probe spacecrafts (payloads) mentioned above.

Comment: *The manufacturers, operators, and users of the space port in Hawaii have to be regulated, since there are many important issues left unanswered. Non-disclosure of next generation space vehicles, and their types of fuels is of importance to the general public, and we should have full knowledge of nuclear materials being used and launched from our island, and have the opportunity to say no to events that can irreversibly affect our property and lives.*

Response: Chapter 10 of DEIS Volume I discusses the policies, plans, and controls for the project area. A partial list of applicable reviews, permits, and/or approvals is presented on pages 10-6 through 10-9. Any vehicle not covered in the EIS would be addressed in supplemental environmental analyses.

In 1987, the Community Right-to-Know standard became law, requiring users of hazardous chemicals to inform nearby communities when they had significant holdings of any of several hundred hazardous chemicals. The definition of significant holdings ranges from 1 lb (0.454 kg) to 10,000 lb (4539 kg), depending upon the chemical. Where the amount exceeds another, usually larger threshold, the law requires that emergency planning programs be established. The emergencies to be considered specifically include releases of chemicals to the environment, as required under Superfund Amendments and Reauthorization Act (SARA), Title III. A Local Emergency Planning Committee is also required under SARA, Title III for large-scale emergencies. Thus, not only would the operator be required to disclose hazardous chemicals, but the community would also be involved in the development of an emergency response plan.

The community also has the opportunity to register its concerns with respect to the development and operation of a Palima Point launch facility through its legislative representatives.

Comment: *The dEIS treatment of natural disasters is inadequate. There are very few places in the entire world that are more hazardous in regard to subsidence, earthquakes, hurricanes, and eruptions than this particular site. The dEIS does not adequately address the potential destruction of the Palima Point facility by an earthquake. The effect of a vertical shear, which could drop 3 to 10 feet, is not adequately examined. The final EIS should look at the potential impact of all probable earthquake effects, including vertical shear.*

Response: The purpose of the dEIS is to assess the hazards in a preliminary manner and provide suggestions of possible mitigations. A careful engineering seismic risk analysis should be performed, as specifically recommended in Appendix IIIA, (page 19, paragraph 5):

> *"A complete and comprehensive seismic risk analysis is recommended as a means of qualifying and systematically evaluating seismic risks and mitigation alternatives. Such an approach requires detailed risk modeling and analysis which is beyond the scope of this report. A complete seismic risk analysis must be based on a detailed design of the facility, which begins with the specification of seismic design criteria as suggested herein. Facility layout and design-type mitigations are employed during the design phase to limit earthquake-related risks. Additional risk mitigation opportunities are available in the specification of normal and emergency operating procedures."*

The unpredictability of earthquakes is recognized, as stated on page 20 of the seismic risk report (*"A primary difference between volcano and earthquake risks is that volcanic activity is more predictable"*). Because most earthquakes on the Island of Hawaii are associated with volcanic activity, the large damaging earthquakes are usually preceded by significant fore shock activity. A period of unusual seismic activity preceded the 2 April 1868 Great Ka'u earthquake including several moderate fore shocks (beginning as early as 9 March 1868, with a swarm beginning on 17 March 1868 (Cox and Morgan, 1977). Likewise, significant fore shocks, including a M_S=5.7 event, were felt prior to the 29 November, 1975 Kalapana earthquake. Thus, when seismologists at Hawaii Volcanoes Observatory (HVO) record enhanced seismic activity, associated with magma up welling, inflation or deflation, etc., an earthquake watch and warning system (such as implemented in California) could be engaged whereby imminent earthquake hazard could be recognized.

Hawaii is fortunate that magma movement and possible large earthquakes are associated with such precursory activity—volcanic eruption and earthquake advisories are possible! Although false alarms may be unavoidable, where no large damaging earthquakes follow enhanced seismic activity, the simple mitigating procedures suggested in the dEIS (such as leaving fire suppression equipment outdoors, or garage doors open on fire stations) would have negligible adverse consequences on regular activities at the spaceport or in the affected communities.

Hawaii is one place in the entire world where anticipation of damaging earthquakes based upon premonitory seismicity (or other precursory phenomena like ground uplift and subsidence) is likely to occur. The historical record of seismicity substantiates this proposition. These seismicity patterns have already been used successfully to predict major eruptions of volcanoes, including Mt. Saint Helens in Washington state, Mt. Pinatubo in the Philippines, and Kilauea in Hawaii.

Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire island of Hawaii. Furthermore, as stated in Appendix IIIA (page 19), the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard, albeit without a formal, quantitative risk analysis, so that the appropriate decision-makers could decide whether to proceed or abandon the project. The dEIS stated the hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the proposed project were to proceed.

Ground subsidence is discussed in the dEIS under geologic hazards and earthquakes (Appendix IIIA pages 11-12). This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Plate 2, Appendix IIIA). As stated on page 13 (Appendix IIIA),

> *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment notes:

> *"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up." The ACTA report continues "... regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka'u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."*

Additional data regarding ground subsidence and cracking is presented in the ACTA report describing specific historical events such as the 2 April, 1868 and 29 November, 1975 earthquakes (page 3). Furthermore, the ACTA report discusses the earthquake-induced ground failures including "extension and contraction failures (cracks)" and "coastal inundation

resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are specifically addressed in the ACTA Seismic Risk Assessment for the three "design" earthquakes under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS recommends *"siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report."* (Appendix IIIA). More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in the Appendix. Specific mitigations mentioned include: *"locate hazardous facilities away from known geologic hazards;"* and *"carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."*

Comment: *The dEIS assumes the Palima Point facilities could somehow be protected against lava flow. History shows such protection to be worthless. The final EIS should reflect actual experience, rather than some hypothetical "lava diverter".*

Response: Page 4-5 of Volume I states, *"If the lower SWRZ of Kilauea should erupt, however, the launch pads would likely be inundated and destroyed. Lava diversion techniques would only be a temporary solution. For example, east rift zone eruptions of Kilauea in 1960 breached diversion barriers, and eventually buried most of the town of Kapoho."*

Comment: *The dEIS does not adequately address the potential impact of hurricanes and cyclones in producing release of toxic and hazardous materials. The final EIS should include a comprehensive assessment of such risks.*

Response: The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community. Structures can be sited, engineered and designed to satisfy these needs. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms. It should be noted that the ability to secure hazardous materials during a severe storm was recently successfully tested at Johnston Island during hurricane John.

While it is possible to build facilities to survive severe storms, it may be costly, which is a factor the launch vehicle organization will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima

Point. If an actual project is planned, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge. Some of the design and operational issues pertaining to tropical storm threats that need to be considered by a developer/operator are :

* Is there sufficient time at the first notice of a potential storm to protect a vehicle that is scheduled for launch and may be partially built-up?
* Can hazardous materials such as liquid propellants be stored in such a way as to survive a storm without the storage vessel being breached and allowing a potentially dangerous spill?
* How will solid rocket motors be protected during a storm?

These questions and other issues relating to severe storms will be addressed in supplemental environmental evaluations if and when a specific project is planned.

Comment: *The final EIS should include the worst case transportation spill scenarios, including a scenario in which the hazardous material team is itself a victim of the spill and other scenarios where there might be no containment possible, such as a spill caused by an earthquake preventing the hazardous materials team from reaching the site.*

Response: In the quantitative analysis of the transportation accident scenario, the type and magnitude of impacts were estimated. This analysis was conducted such that *"catastrophic (and unlikely) events of instantaneous (15 seconds or less) spills of an entire tank, drum or cylinder were analyzed to evaluate the magnitude of the consequences and to consider possible risk management"* (see page 5-41 of Volume I of the DEIS).

Reevaluation of this scenario such that an entire truckload is spilled and the HAZMAT team is unable to contain the spill for whatever reason is unnecessary because spill of one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers: *"The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide"* (page S-4 of Volume I of the DEIS). Also, a possible mitigating measure would be to transport hypergolic propellants to the site in single container shipments.

Hazardous materials personnel would be present at the site at all times. Uncontained on-site spills of toxic chemicals are assessed in the dEIS. The analyses are a conservative

overestimate, however, because areas on-site where toxic propellants are stored or transferred would require containment barriers with 110% capacity, as specified by EPA regulations.

Comment: *The dEIS consultant did not contact known experts in various areas, such as endangered turtles. Possible impacts on all endangered, threatened, or potentially threatened species should be assessed in the final EIS, including a review of all existing studies to date on such species to determine whether adequate data even exists to make such a determination.*

Response: Throughout the entire two years of involvement in the program, DBEDT's consultant, Dr. Richard Brock, was in contact with Mr. John J. Naughton of the National Marine Fisheries Service with respect to the turtle populations and the studies made at both Palima and Kahilipali areas. Thus the comment that "known experts were not contacted" is in error. Dr. Brock also discussed with Mr. Naughton the issue of humpback whales (an endangered species). Mr. Naughton is the NMFS representative in charge of reviewing EIS documents with respect to endangered species and habitat alteration.

12-341

Comment: *The dEIS does not adequately address the circulation of water on the coast and, therefore, cannot assess the impact caused on the aquatic environment by pollutants released during rocket launches, such as aluminum oxide, or other pollutants reaching the aquatic environment from normal operation or accidental release at the facility. Enclosed are copies from Atlas of Hawaii, second edition. Exhibiting both water and air currents for the Island chain. Oddly enough, water current appears to return to the Island of Hawaii for both equatorial and polar launches. Therefore, a more in depth launch-caused pollution study of aquatic environment is needed for the EIS.*

Response: First, it should be recognized that the organic contaminants released by launch vehicles are not bioaccumulated or bioconcentrated as discussed by Dr. Greenberg (RSA). Secondly, aluminum is far more prevalent than most people realize in Hawaiian (volcanic) soils. There are significant deposits of aluminum (bauxite) on Kauai and with no discernible biological effects.

The tidally driven coastal currents along much of Hawaii's coasts are not well-known and the reference cited is not up-to-date. The figure depicting surface currents in the Atlas (page 51) shows similar currents all around Hawaii Island in the coastal areas (i.e., within 3-5 miles of land). This is very deceptive -- some of the coastal currents are very strong which is not shown in this figure and were not known at the time this book was printed. A case in point are the currents around Keahole Point -- the surface currents within 100 meters of shore may move in excess of 1 meter per second and the directions as shown in this figure are not accurate for that area. The oceanographic community learned about the Keahole Point

currents while developing the NELHA facility there. Thus drawing conclusions from the information in this atlas is tenuous at best.

In response to your comment about ocean circulation and pollutants released by rocket launches, it should be remembered that the ocean fronting Palima Point is very rough and exposed to the NE trades. Any pollutant reaching the ocean either via an "on-land" accident or from normal launch operations would be very rapidly diluted just because of the rough nature of the ocean in the area. Additionally, one should note that water depth increases rapidly along the coast from the shore. The "shelf" on which one finds hermatypic corals (the usual corals of coral reefs which are normally restricted to water less than 200 ft deep) is within 100 yards of shore along much of the area; in other words, normal coral reef communities are restricted to a very narrow band along most of this coast and open ocean conditions exist right up to the shore. Thus with surface or shoreline input, the benthic (bottom) communities would probably have little if any opportunity for exposure to any pollutant coming into the system at the surface or carried in by groundwater.

To bring home the point about the exposed nature of this coast (thus the ability to "dilute" a pollutant), one should remember that it is exactly these harsh conditions (i.e., open-ocean swells breaking on the coast) that are the reason why opihi pickers sometimes disappear while picking opihi on this coast.

In further response to this comment, it should be noted that if these launches were polluting the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg AFB facilities. One of the best "de-facto" wildlife preserves is right adjacent to the Canaveral launch facility. This preserve is maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. This preserve (the Merritt Island wildlife refuge) is an estuarine system with relatively low water circulation -- just the opposite of Palima Point in terms of water movement. Additionally at Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

Appendix IIIE concludes that pollutants from the spaceport entering the ocean would be undetectable. It should also be realized that the organic contaminants that are released by the launch vehicles are not bioaccumulated and that aluminum released into the environment is not a foreign substance in Hawaii; significant aluminum exists in Hawaiian soils (especially on Kauai in the form of bauxite).

Finally, we recognize that if the project were to proceed, a comprehensive monitoring program should be in place to insure that the integrity of air, ground and nearshore marine waters and communities are not compromised.

Comment: *The dEIS does not contain information regarding actions taken to conform to obligations of the United States pursuant to "The Convention Concerning Protection of the World Cultural and Natural Heritage", a United Nations treaty to which the United States is a signatory. The United States Park Service views the proposed facility as a threat to the Hawaii Volcanoes National Park. The final EIS should address what those treaty obligations are, how they will be met, and the possible impacts on the project of treaty obligations (including potential costs of mitigation required by the treaty.)*

Response: As stated in the dEIS, Volume II, page 7-24, *"HVNP is recognized as an International Biosphere Reserve and a World Heritage Site."* The following additional wording will be added to this statement: "These designations are not only prestigious, but under international treaty, require that The World Heritage Committee (UNESCO) be notified of any threat to a World Heritage Site."

At the present time, there is no threat to a World Heritage Site as there is no project. Should a specific project be proposed, appropriate federal agencies--those that have the authority to speak for the "host country"--would be provided, at their request, with all of the information developed during the EIS process.

12-342

Comment: *The dEIS does not address the potential contribution to ozone destruction from rocket launches at the Palima site. Launch rockets may use fuel that puts ozone destroying chemicals into the atmosphere. The possibility that such fuels might be used and their potential impact on the ozone layer should be addressed in the final EIS.*

Response: Both Volume 1, page 161, and Appendix XD address the potential contribution of launch emissions to stratospheric ozone layer depletion. The results of the analyses performed conservatively indicated ozone depletion due to the launch emissions to be approximately 0.009 percent annually.

Comment: *Besides endangered species discussed in Comment 4 above, the DEISM [sic] fails to adequately address ecological impacts. A natural disaster in the presence of highly toxic materials could pollute an area for the life of the land. The final EIS should include the total ecological impact potential of this proposed facility in multiple worst case scenarios.*

Response: On page 4-5 of Volume I of the DEIS, it is stated that *"Rocket propellants stored at the proposed launch facility pose a hazard to people and the environment in the event that an earthquake causes a failure of containment. The three principal consequences of propellant releases are leaks or spills, fires and explosions. Any one of the three may result in the other two."* The potential effects of spills are presented in Section 5 of Volume I of the DEIS.

Toxic releases from spills of liquid propellants on the launch facility site are evaluated on page 5-127 of Volume I of the DEIS. In the analysis it is assumed that the entire contents of a storage vessel is released under a multiple worst case scenario. The analysis is based on worst case meteorological conditions, a maximum vessel size of toxic propellants that could be released (615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide), that the propellants would not react, and that the spilled liquid is allowed to remain and evaporate over time with no effort made at remediation. The resulting cancer risk due to a hydrazine release under this accidental scenario (which could conceivably occur as a result of a natural disaster such as an earthquake, however, it is considered unlikely due to containment barriers) is 9.5×10^{-4}. The maximum acute hazard index is 10.6 at Pahala.

Thus, *"the individual cancer risk from just one on-site spill is significant. Acute and chronic adverse health effects in the surrounding community will also occur under unfavorable wind conditions from just one on-site spill"* (page 5-132 of Volume I of the DEIS). While there may be additional storage of these fuels as well as other toxic chemicals at other locations on-site, reevaluation is not required, however, because the spill described above has already been shown to result in significant impacts on nearby residents and workers. These risks do not account for the mitigating measures that will be in place for earthquake safety which are listed on page 5-135 of Volume I of the DEIS.

In the event of such a spill, the food chain will not be adversely affected because none of the substances potentially spilled are bioaccumulative (in other words, substances such as aluminum oxide, hydrogen chloride, and hydrazine do not accumulate in plants or in animal tissues such as meat or milk).

The rocket propellants will not accumulate in soil either. The soil half-life of hydrazine is listed as ranging from 1-7 days while the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992), indicating that hydrazine deposited to the soil will degrade rapidly.

We would also like to add that, should there be a volcanic eruption and/or earthquake of sufficient magnitude to destroy the spaceport and release the entire contents of the fuel storage facilities, the presence of hydrazine or other rocket fuels would be the least of Ka'u's worries.

Comment: *The dEIS does not adequately address the potential for upper level winds to push the plume above 15 degrees above the horizon obscuring the island telescopes. Given the climate destabilization already happening even a one year study would not provide a reliable data base upon which to base a conclusion as to the effect of the facility on astronomy.*

Response: Further analyses were performed using statistical data collected from the surface to 70 km altitude at Barking Sands, Kauai to assess the potential for favorable winds at the launch site. This data set does not replace the need to perform site specific measurements if and when the project moves forward, but it does provide a reasonable assessment of the probability for favorable conditions. A copy of the report is attached.

Comment: *The Island of Hawaii has various wind shifts that have to be studied as to acid rain effects, and the potential for nuclear fallout caused by launch vehicle pollutants. Each wind pattern must be examined, and complete data analyzed for the protection of the environment.*

Response: The area near the proposed site of the spaceport facility is subject to atmospheric concentrations of naturally occurring corrosive substances such as sodium chloride from the ocean and emissions of acidic gases and particulates from nearby Kilauea Volcano including sulfates, nitrates, chloride, fluoride, etc. (see Section 11.0 of the Health Risk Assessment contained in Appendix VIIIA of the DEIS).

In Appendix VIIIA, it was determined that the concentration of HCl due to wet deposition following a normal launch (assuming that immediately after launch it begins to rain) is 0.45 mg/l. In the event of a conflagration episode, assuming that all of the HCl possibly generated by the nine solid rocket boosters is released, the concentration of HCl due to wet deposition would be 2.1 mg/l. The pH of the water collected following these two events would be 4.9 and 4.2, respectively (calculated according to the algorithm presented on page 3-7 of the ecological risk assessment contained in Appendix VIIIB of the DEIS). The pH of a neutral solution is 7.0 while the pH of municipal drinking water is required to be between 6.5-8.5 according to the National Secondary Drinking Water Regulations (secondary maximum contaminant levels; Last 1980).

Average pH of rainfall in the continental United States ranges from 4.2 in the Ohio area (considered acid rain) to levels greater than 5.0 west of the Mississippi (up to 5.4 in Northern California and Oregon; Kulp 1988). The contribution of rocket exhaust clouds to the formation of acid rain around Palima Point may be minimal because acid rain is also formed through the liberation of sulfates and nitrates through volcanic activity. A study of acid rain in the area around Volcanoes National Park measured the pH of rainwater and found that the pH varied between 2.6 and 4.6 during the study period (Nachbar-Hapai et al. 1989). Thus, normal rainfall in the area is already more acidic than wet deposition of HCl during a conflagration event. Given the ambient conditions of the area and the fact that atmospheric acidic chemicals already exist, the contribution of HCl emitted following launch episodes to "naturally" occurring corrosion is probably not significant.

The dEIS acknowledges that site specific meteorological data was limited and that the certain aspects of spaceport hazards analyses cannot be fully addressed unless, and until, an on-site meteorological data collection program is implemented. DBEDT's consultant ACTA, has experience with operating the toxic dispersion models for literally thousands of meteorological balloon soundings for Cape Canaveral Air Station, Vandenberg AFB, and Edwards AFB. This experience has given ACTA insight into the meteorological patterns which typically result in the most unfavorable toxic dispersion conditions.

The seven atmospheric soundings used as a basis to analyze the dispersion of rocket exhaust plumes and abort clouds were intended to cover the range of the most prevalent weather patterns expected to occur in the Palima area. When examining the feasibility of a spaceport operation and its potential impacts on the environment and local population, it is reasonable and prudent to examine the range of meteorological conditions which apply to the area. The existence and documentation of "best case" scenarios indicates that there are certain weather patterns which are favorable to safe launch conditions and this information is of value to potential customers of an economically viable space launch operation. Likewise, every effort was made to understand the unfavorable aspects of the Palima meteorology in order to define a "reasonable worst case scenario" for assessing the health risks associated with potential launch aborts and accidental spills. Determination of these conditions involved coordination between ACTA analysts and Dr. Thomas Schroeder, a meteorologist at the University of Hawaii, as well as review of other publications pertaining to meteorological studies of the island of Hawaii.

As a result of these considerations, a hypothetical worst case meteorological data set was defined for use in the toxic dispersion analyses. Appendix VID pages 2-1 through 2-4 and pages 4-1 through 4-11, presents a description of the important meteorological features which affect the rise, stabilization, and dispersion of exhaust plumes. The "worst case Kona" weather condition was defined with the following features:

- Base of the persistent tradewind inversion was lowered to 5000 feet from 6360 to represent a lower "trapping lid" beneath which the rocket exhaust gases are trapped and disperse back to the ground level.

- Winds at all elevations were oriented in the same direction thereby eliminating the enhanced gas dispersion attributable to wind shear.

Both of these modifications result in conditions which limit the dispersion rate of the rocket exhaust and result in increased ground level concentration predictions. A further "worst case" condition was added to the toxic hazard analysis by assuming that the wind direction on any given day could direct the exhaust cloud directly toward any of the 66 sensitive receptor points identified in the study. The maximum concentration exposure levels for these worst case weather and plume travel scenarios were documented and tabulated in Appendix D for

each possible vehicle abort mode and each chemical species of concern and applied to the candidate launch vehicle containing the largest quantities of both liquid and solid propellants (Delta II 7925). The human health risk assessment (Appendix VIIIA, page 2-2 and page 6-4) and ecological risk assessment (Appendix VIIIB, pages 3-11 to 3-13) conducted by Risk Science Associates also included evaluation of hazard indices based on exposure levels derived from these worst case scenarios.

The meteorological conditions applied to predict toxic gas dispersion from accidental spills of liquid propellants which evaporate from pools without combustion were also modeled over a range of wind speeds, atmospheric stabilities, wetted pool areas and inversion heights in order to identify the conditions which result in the largest toxic hazard corridors. Once again the assumption was made that the surface winds transporting the hazardous gas could travel in any direction and concentrations at the 66 sensitive receptor sites were calculated assuming the plume travel from the spill site directly toward the receptor. The conservative nature of these modeling assumptions and the expectation that these scenarios would have a high probability of not underestimating the toxic hazard are addressed in more detail in Appendix VID, pages 5-1 to 5-3. The maximum spill quantities for the hypergolic liquids were based on 728 gallons of nitrogen tetroxide and 615 gallons of Aerozine-50 which represent the total Stage 2 tankage of a fully fueled Delta II launch vehicle. These spill quantities combined with the worst-case weather conditions are deemed to represent worst case scenarios and they far exceed the accidental releases of liquid propellants which have been experienced in thousands of propellant transfers at the mainland launch facilities.

In summary, it should be stated that during actual operations of the Palima spaceport the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I on page 2-14 states:

> *"Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket. Air quality and meteorological measurements are conducted continuously to ensure rapid detection and response to elevated levels of hazardous vapors."*

This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would also be required to comply with federal and state emergency preparedness and hazardous materials handling requirements as described in Volume I page 5-136 section 3.0 entitled, *"Emergency Response Capabilities"*.

Comment: *At the 11/1 hearing, Bruce Plasch...said his study of economic impacts did not address environmental impacts. [Appendix, ref 5]. ...[there is a need to] connect ecological impact to economic decisions. The final EIS should examine the ecological impacts ... as well as the natural disaster and accident scenarios, to determine the economic impact of such ecological impacts....A worst-case scenario might well see the entire economy of the island destroyed. To divorce an economic impact analysis from this potential ecological result provides an artificial and incomplete result. See enclosures nuclear power plant.*

Response: The economic impacts addressed in the EIS are based on the assumed development scenario. Although the EIS addresses the probability of potential accidents, it would be impractical to address the economic impacts of all possible (but highly improbable) scenarios inasmuch as there are an infinite number of them.

An accident related to launch operations, however, that would destroy the entire economy of the Big Island, or even a significant portion of it, is not regarded as a realistic possibility.

Comment: *A study of the effect of nuclear power plants on the value of agricultural land in 494 [US] regions was conducted. The research tested a reduced-form equation of the average price of an acre of agricultural land in proximity to a nuclear reactor against dummy variables. Research results indicate a significant negative effect on the value of agricultural land by the proximity of a nuclear plant, which increases with the age of the plant. Both [nuclear power plants and Spaceport] totally destroy property values in the event of nuclear failure."*

Response: The impact of launch facilities on property values is addressed Appendix IXA. As discussed in the report, a small loss in the market value of agricultural land located within the Population Control Zone is expected because of the loss of development potential. This loss is expected to be small because the area is not subject to development pressure. Whatever the loss in land values, the adverse impact can be mitigated by paying landowners for their losses.

Even though a loss in the market value of this land is expected, little or no loss in the agricultural value of the land is expected since the agricultural potential of the land would not be affected.

Regarding a total loss of property values in the event of nuclear failure, this is not an issue with the proposed launch facility because nuclear fuels would not be used.

Comment: *We "incorporate by reference" the comments of Keiko Bonk-Abramson (or whoever is signing them) on the inadequate treatment of cultural and sociological impacts.*

Response: Enclosed for your information is a copy of her letter and the responses sent to Councilmember Bonk-Abramson.

Comment: *Tourism may be effected [sic] by boycotts from those choosing a vacation spot in support of banning space nuclear power sources if the conceptual project continues."*

Response: The impact of the launch facility on tourism is addressed in Appendix IXA, Chapter 5. As discussed in this Appendix, the facility would cause a small increase in tourism due to the addition of visiting workers and their families. Also, a number of visitors might be attracted to Ka'u to witness the occasional rocket launches.

Tourism boycotts due to nuclear material are not anticipated, as no major radioactive sources would be permitted at the launch facility pursuant to Act 172. Minor sources could be utilized for calibration and measurement.

Comment: *The cost of further study and answers to the public's comments must be paid for by the people of Hawaii, and not an aerospace consortium or private venture. Whoever pays the piper calls the tune. While further expenditures on the EIS would be money wasted, if public officials are determined to waste resources simply to develop still further evidence to support cancellation of this project, then they should at least guarantee public control of the further study. They should also be prepared to explain to the public why they wasted such resources when the project is finally canceled.*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State funded the EIS to disclose the impacts of building a spaceport as a guide to State decision makers in determining whether or not resources should be allocated to site acquisition, permitting and further analytical studies related to the spaceport initiative. No further resources are being allocated for site acquisition, permitting and further analytical studies. The Department is, however, responding to comments received during the public review process.

References:

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Last, J.M., ed. 1980. Public Health and Preventive Medicine, Eleventh Edition. New York: Appleton-Century-Crofts.

Nachbar, M., Siegel, B.Z., Russell, C., Siegel, S.M., Siy, M.L. and D. Priestley. 1989. "Acid Rain in the Kilauea Volcano Area." Arch. Environ. Contam. Toxicol. 18:65-73.

Attachments

The comment letter from Ms. Keiko Bonk-Abramson and DBEDT's response appear earlier in this Section. Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response. See DBEDT's response to Ruth M. Bass for the THREATCON procedures that were also attached to this response.

c: DBEDT, Ken Munechika

LS 10/25/93

COMMENTS ON THE SPACEPORT ENVIRONMENTAL IMPACT STATEMENT

Date 11 OCT 93

Dear Governor Waihee,

Please consider my concerns and answer my questions before accepting the spaceport EIS:

The area near Pahala is totally unsuited for a Spaceport. Reasons:

(1) Kamehame is the nesting place for the Hono

(2) The Great Black runs thru the area dominating the Manuka complex and the Kiawe complex. An unstable area.

(3) The 1923 flow covered in the area.

(4) The ground water is contaminated by mill water from the plantations

(5) There are petroglyphs and ancient structures in the area.

We do not need a Rocket Facility we need a Dairy there.

(6) Where is the water coming from. The ground water is contaminated by mill water.

(7) Nonsense: 300 tons of SO2 is released from Kilauea every 24 hrs

SIGNED: Basil W Hansen

(Print Name): Basil W Hansen

ADDRESS: Po Box 6331 Capt Cook Hawaii

12-346

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SEP. 30 1994

Mr. Basil Hansen
P.O. Box 6331
Captain Cook, HI 96704

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)- CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Hansen:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Your comments were difficult to read, we apologize if we do not address all of your concerns correctly. KRP Information Services and Cultural Surveys Hawaii contributed to this response.

General Comment: *The area near Pahala is totally impractical for Spaceport.*

Response: You are among many who expressed this opinion. It is the purpose of the EIS to present factual data. As stated in the cover letter:

> *"The acceptability or non-acceptability of the impacts disclosed--and the efficacy of the mitigating measures presented--is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.*
>
> *After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time....Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services."*

Comment: *Kamehame is the nesting place for the ? (unable to read)*

Response: We assume you are referring the green sea turtle and the hawksbill turtle. Federally listed endangered green sea turtles (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) have been reported in the vicinity of Palima Point (DEIS Appendix IIIE). The area around Palima Point offers foraging for both turtle species. Green sea turtles migrate to French Frigate Shoals to breed while hawksbills nest mainly on beaches in the main Hawaiian Islands and have been found nesting at Kamehame Hill, Punalu`u Bay and Ninole Cove (Appendix IIIE) and at Apua Point and Halape in Hawaii Volcanoes National Park. Based on recent surveys of the Palima Point area, the majority of sea turtles observed in the area are green sea turtles. In an inventory of the area, Brock & Kam (1990) only observed green sea turtles, and in surveys conducted since 1976, no hawksbills were captured at Punalu`u, although immature hawksbills were observed outside of the bay in 1994 survey by Balazs et al. Brock & Kam (1990), however, did find evidence of hawksbill nests at Kamehame Hill.

Potential adverse effects to sea turtles associated with the proposed Palima Point Spaceport and proposed mitigation measures are discussed below. While it is noted that other factors could potentially impact these species, this response will focus primarily on the potential impacts due to exposure to chemicals. As stated in Volume VIII of the dEIS, there is a potential for adverse impacts to avian and plant receptors due to conflagration and deflagration events and transportation and on-site spills. The dEIS proposes mitigation measures wherever possible, however, the acceptability of these measures is left to be determined by the appropriate federal and state regulatory agencies.

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Green sea turtles on the main islands of the Hawaiian chain do not bask on land, they only rest underwater on subtidal ledges where they have been known to stay submerged for two and half hours. Of the two species inhabiting the area, therefore, only female hawksbills leave the ocean to come ashore when they lay their eggs in nests on the beach (copulation takes place in the water).

As stated in Appendix VIIIB of the dEIS, the main route of exposure to foraging sea turtles would be through inhalation of contaminants in the air (even if there were contaminants in the water it is very unlikely that they would be absorbed through the leathery skin of the turtles). Because toxic releases from rocket launches are of short duration, the actual dose of contaminant that a turtle would receive would probably be minimal. For example, a turtle resting underwater would have no exposure at all. If a turtle is at the surface when toxic fumes are released, the exposure would be intermittent. This is because turtles have a variable breathing pattern which consists of a period of apnea followed by several closely spaced breaths.

Hawksbills would probably have the highest exposure to contaminants released by spaceport activities because they are the only sea turtles which come on land in the Palima Point area. Hawksbill females laying eggs or nestlings leaving the nest could inhale contaminants released during launch activities. Incubating eggs could also be exposed to contaminants in soils if contaminants from a spill were to reach the beach at Kamehame Hill. Considering the distance of Kamehame Hill from the launch pads and the propellant storage area, it is improbable that a spill would reach the beach. It is more likely that wet deposition of atmospheric contaminants could contaminate sand, thus exposing eggs and nestlings.

There is no available eco-toxicological data on the potential effects of exposure to contaminants that may be released from the spaceport to hawksbills, therefore, it is unknown what the impact may be, if any, to nesting turtles. In the absence of toxicological data, however, the most effective mitigation measure for nesting hawksbills would be to establish a sea turtle nesting preserve in the area surrounding Kamehame Hill. This area could be routinely monitored for the presence of contaminants in the air and soil after launches as part of a Mitigation Monitoring Program.

In developing a Mitigation and Monitoring Program, care must be taken to establish the natural background levels and acidity and correct for acid and other deposition due to volcanic eruptions. It should be noted that the deposition of acidic substances from a launch is extremely small when compared to releases and deposition from the volcano. It must also be noted that historic exposure of turtles to these volcanic gases dwarfs any future exposure from rocket launches. It is extremely doubtful that acid emissions from launches would have an impact on turtles in the area unless there was a "direct hit" of a fragment from a destroyed rocket on Hawksbill turtle breeding grounds. Nevertheless, a monitoring program may be useful to allay fears and serve as an early warning system.

A similar analysis can be made concerning organic emissions of hydrazine, UDMH, and other toxic chemicals. While the toxicological data base is unfortunately

inadequate in regards to eco-toxic effects, if turtles are no more sensitive to the chemicals in question than the animal species tested as described in the literature (or humans, for that matter), it is doubtful that emissions under normal or accident scenarios would have a significant impact on turtles.

It is also unlikely that the turtles could be impacted via their food supply because the substances emitted are not bioaccumulated or concentrated in the food chain.

Other launch sites have sea turtles present during launches (e.g., the Kauai facility at Barking Sands, and the Canaveral facility in Florida). Other activities at the site, such as light pollution and human disturbance, could potentially have a higher negative impact on turtles than the release of toxins into the atmosphere. These potential impacts can be mitigated by a lighting plan (such as in place at Cape Canaveral) and management of human activities near nesting sites such as proposed in the Shoreline Access Management Plan (Appendix XF). As noted in Appendix IIIE of the dEIS:

> *"Sea turtles nest on the beaches at the Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success, the facility operation has reduced all unnecessary lighting near the beaches and employed low pressure sodium lights with shields. In the event of an evening launch, the operational plan uses only lighting in critical areas. The lighting procedures are inspected by the U.S. Fish & Wildlife Service for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill. The hill itself is situated right on the shoreline--the nesting beach is located seaward of the hill. It is probable that Kamehame Hill will serve to block much of the light from inland sources. However, as a precautionary measure, it is suggested that a light management plan similar to the Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built."*

It should be further noted that during the several trips made to the Kamehame Hill area during the field work (from 1990 to 1993), there was considerable evidence of fishermen camping on the beach (particularly at the southern end) in the form of tent pole structures, rubbish and firepits (a source of light as well as flashlights as evidenced by numerous expended dry cell batteries in the area). During one trip vehicles and campers were established on the south end of Kamehame Hill. The great concern of the public over turtle nesting at Kamehame Hill is not borne out by the actions of the public. This does not make the proposed project "correct", but it points out the fact that disturbance to turtles attempting to nest on this beach have probably been ongoing for some period of time. With a management program in place that controls access and lighting, the situation should be better than it has been in the recent past insofar as sea turtle nesting is concerned.

Comment: *The Great Crack runs thru the area .....An unstable area....the 1823 flow occurred in the area.*

Response: The threat of lava inundation and seismic activity was disclosed in the dEIS (Volume I, Chapters Three and Four and Appendix IIIA). The dEIS also recognizes

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that inundation by lava would result in catastrophic destruction of the launch facility. Such occurrence would effectively shut down the launch facility permanently. As stated in the dEIS, Volume II, page 8-4:

> *"If the lower Southwest Rift Zone of Kilauea should erupt, however, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."*

The State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. If and when a private developer proposes an actual project, lava flow and seismic hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

Comment: *There are petroglyphs and ancient structures in the area. We do not need a Rocket Facility we need a dairy there.*

Response: You are correct that there are petroglyphs and ancient structures in the area. This fact was fully disclosed in the dEIS (Volume I, Chapters Three and Four, and Volume IV, Archaeological Reconnaissance Survey).

Continued use of this area for agricultural purposes - particularly grazing and dairy farming - is not a guarantee that archaeological sites will be preserved. There are many instances in the area in which cattle have impacted archaeological sites, either directly with the activity of hooves, or mechanical pasture improvement, such as vegetation clearing, chain-dragging and other bulldozing.

In general, agricultural uses do not come under the permit process so that protection of archaeological sites cannot be controlled through coordination with government agencies. The permitting process for the spaceport would include compliance with all environmental laws, including those related to archaeological sites. Mitigation measures include preparation, approval and implementation of data recovery and preservation plans, as well as continued management of the significant sites.

Comment: *The groundwater is contaminated by mill water from the plantation. Where is the water coming from? The ground water is contaminated by mill water.*

Response: Groundwater resources are described in Volume I, Chapters Three and Four, and in more detail in Appendix IIIB of the DEIS. Sustainable yields for the two aquifer systems within the project area are estimated to be 134 mgd. Current water usage is calculated to be 12 mgd, of which approximately 82 percent is used by agriculture and industry. Future needs (2010) are estimated to be 12.3 mgd without the spaceport and 12.5 mgd with the spaceport.

Harding-Lawson Associates identifies the existing drinking water wells in their groundwater resources report (DEIS, Appendix IIIB) which are located inland from the proposed facility near the town of Pahala and along the highway to the south of the site (see the well inventory in Table 1 and the groundwater hydrology map in Plate 3 of the HLA report). The future potable water supply at the spaceport is anticipated to be upgradient from the facilities and not affected by the mill waste. With the closing of Ka`u sugar, mill waste will no longer be a potential problem anywhere on the site.

Comment: *Corrosion: 350-1600 tons of SO2 is released from Kilauea every 24 hours.*

Response: Acid rain and vog (volcanic smog) are described in Volume I, Chapter Five of the dEIS. They are well recognized hazards on the Island of Hawaii, causing respiratory problems for sensitive people. Acid rain is a local environmental problem that already exists - whether or not a spaceport is constructed in the area - due to the volcanic activity on the island. Although effects of these corrosive deposits on metal and other industrial equipment were not specifically addressed in the dEIS, acid rain would be considered in the design and operation of the spaceport in terms of maintaining equipment and facilities in good operating condition.

Both Cape Canaveral AFS and Vandenberg AFB are experienced with corrosion problems as both are located along coastlines in middle latitudes where salt spray is abundant. Furthermore, because space launch vehicles carry highly corrosive rocket fuels they are designed to withstand these corrosive reagents. Components of gases emitted from rocket exhaust include HCl, which forms acidic droplets when mixed with the pad cooling flush water. Consequently, launch pads are designed to withstand acidic rain, and are maintained accordingly. Washdown of facilities and careful maintenance is required to withstand the effects of the corrosive atmosphere at CCAFS; similar procedures would necessarily be applied at Palima Point. Vandenberg AFB has had a Corrosion Control Program in continuous operation, led by a Corrosion Control Engineer who specified appropriate paints, schedules for sand-blasting and painting, washdowns, and so forth to keep the facilities in good condition. The cost of maintenance and operation of the Palima facility to combat corrosion should be comparable to that at Cape Canaveral and Vandenberg.

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Comments to the Draft Eis for the Proposed Ka'u Spaceport

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TEN ARGUMENTS AGAINST A SPACEPORT IN KA'U

BY JAY HANSON

#1 – A SPACEPORT IN KA'U IS A WASTE OF TAXPAYER MONEY AND TIME

Is there actually a market for a spaceport in Ka'u? If so, what kind of market and what kind of spaceport?

There has never been a market study that shows a need for a spaceport in Ka'u. *But there has been at least one market study that shows there is NO need for a spaceport in Ka'u.* The August 1987 A. D. Little report states on page #V-10: "Worldwide launch capacity appears to be sufficient to meet expected demand for launch services over the next 10 to 15 years."

Since 1987, when the A. D. Little study was published, the Cold War has ended, U.S. military budgets have been cut, and Russian Proton rockets, technicians and facilities are now available to launch commercial satellites at cutthroat prices.

Will the large Russian rockets that are flooding the market have a negative impact on the economics of a spaceport in Ka'u? Not according to Ken Munechika of the Office of Space Industry (OSI). On Sep. 17, 1993, the Tribune Herald reported Munechika as claiming "We're not in direct competition with that kind of launches. We're not in the same league." *OK, I give up. What league are we in?*

Munechika asserts that we have a "niche market" in small satellites, citing Motorola's Iridium project as a potential customer with Lockheed promising to help us to get our spaceport off the ground. But despite Munechika's claims, the truth is that the Russian rockets *would* have a negative impact on a spaceport in Ka'u. Hasn't anyone told him that small satellites are launched on large rockets?

On Jan. 4, 1993, Space Business News (SBN) reported that Lockheed has formed a joint venture with the Russian Khrunichev plant to sell Proton launchers worldwide. According to Mel Brashears, one of Lockheed's vice presidents, because of Proton's size – 44,000 pounds or about 80 percent the size of a Titan 4 – the rocket will be marketed as a multiple satellite launcher. Depending on each satellite's size, Proton could launch seven to twelve "birds" at a time. "We see multiple satellite launches as the wave of the future." Accordingly, Lockheed-Khrunichev International (LKI) is already pursuing three launches of an undetermined number of Iridium satellites.

As recently as May 26, 1993, Governor Waihee announced that the State of Hawaii and Lockheed had exchanged letters of agreement to cooperate on the development of the commercial spaceport project proposed for the Ka'u. "The proposed spaceport presents an exciting opportunity for both the State of Hawaii and private industry, making it a leading candidate for future U.S. commercial launch operations," said Albert E. Smith, Lockheed's vice president of Advanced Government & Commercial Systems.

Huh? What about Lockheed's deal with the Russians to launch the Iridium satellites?

On Sep. 15, 1993, United Press International (UPI) reported that Lockheed has formed a commercial launch company named "Lockheed-Khrunichev-Energia International" (LKEI). "This is LKEI's first major launch services agreement and it marks a significant milestone for U.S. and Russian industrial cooperation in space," said Lockheed Chairman Dan Tellep. "With our combined capabilities, LKEI can offer satellite manufacturers and other customers reliable, cost-competitive access to space."

If Lockheed is making even more deals with the Russians, why are they still interested in Ka'u? It just doesn't make any sense.

What other commercial spaceports compete for "civilian" satellites? On June 24, 1993, Reuter's news service reported: "Western Europe's Ariane-4 rocket has launched 60 percent of the world's commercial space satellites. . . . The scheduled introduction in 1996 of the more powerful Ariane-5 should give Europe exclusive control of the heavy satellite launch market. . . . 'The (satellite launch) market is very small,' said Charles Bigot, president of Arianespace, the Paris-based company that launches Ariane rockets from the European Space Agency (ESA) launch centre in French Guiana."

Arianespace also knows how to launch small satellites on large rockets. According to the "World Guide to Commercial Launch Vehicles", a small satellite carrier was introduced by Arianespace in 1990 that allows several small satellites to ride the present day Airiane-4 vehicles "piggyback" along with the main satellite. For example, on Sep. 23, 1993, Space Fax Daily reported that Arianespace will launch six small satellites at the same time as its next major satellite by using the piggyback system. Moreover, the Arianespace launch facility is approximately 900 miles closer to the equator than the proposed Ka'u spaceport and can service virtually any orbit a customer would need.

There is new major competition in the South Pacific for "civilian" satellites. On Sep. 16, 1993, Reuter's reported that an Australian company, "Space Transportation Systems" (STS), has signed a deal with several Russian space firms to build a spaceport in Papua New Guinea (PNG). The PNG government has agreed in principle to the spaceport and the small island of Manus, off that country's north coast, will likely be the site. Satellites could be launched in both polar and equatorial orbits from Manus. Manus is approximately 1,000 miles closer to the equator than the proposed Ka'u site which gives Manus tremendous advantages for equatorial orbits.

There is even new major competition from existing Air Force rocket ranges. On Oct. 17, 1993, the Santa Barbra News Press reported that the Air Force will spend over one billion dollars to modernize its existing ranges. "Additionally, the push to bring commercial space launches has military leaders heralding a stable future."

According to a report titled "The Future of the U.S. Space Launch Capability", by the Vice President's Advisory Board, Nov. 1992: "If the United States is to remain competitive, it must reduce its cost (and price) to launch payloads by a factor-of-two . . .Current systems [rockets] will not be competitive in the long term. Even with the introduction of new technology launch vehicles, it is doubtful that U.S. industry can compete with the 'flexible' prices that can be charged by the non-market economies without some type of government support for fair pricing provisions and mechanisms to enforce compliance." In other words, *even if a new generation of rockets were developed, it is doubtful that the U.S. can compete in the civilian space launch market.*

Even NASA agrees that using foreign launchers could reduces costs by an order of magnitude! On Nov. 16, 1993, Reuter's reported that NASA Director Daniel Goldin told a Senate panel he favored joint ventures with other nations in order to save money, such as using foreign launchers to send U.S. missions into space. For example, he said, a mission to Pluto aboard a U.S. launcher would cost about $500 million just for the launch. Aboard a foreign launcher, such as those available from the Soviet Union or China, the launch would be in the $50 million to $100 million range.

We have just seen overwhelming evidence that there is no market for a commercial spaceport in Ka'u to launch "civilian" satellites. *Has Munechika lied to the State Legislature, the County Council and the business community concerning the economic viability of a spaceport in Ka'u? (Or does Munechika have a hidden agenda?)*

#2 -- LOCKHEED IS HERE TO LAUNCH SDI (STAR WARS) PAYLOADS

First we must be clear on one point. A "commercial" spaceport is one that is run by a "civilian" company instead of the "military." But it does not follow that a commercial spaceport will launch only civilian payloads. Indeed, experience with Poker Flat has been exactly the opposite.

In 1987, the State House of Representatives formed a "Spaceport Work Group" to examine the A. D. Little report and recommend legislative action. One of its key findings was: "There is a potential source of business for niche market launch companies not included in the launch requirement studies: the Department of Defense. NASA's budget of about $7 billion is less than half the Department of Defense's space budget of around $16 billion. What that budget would become and what the resulting launch demand would be if the Strategic Defense Initiative goes forward is stunning. [SDI is going forward on both Kauai and Maui] The Department of Defense has already contracted some SDI research launches to a commercial launch firm." *Thus, commercial launch firms will handle SDI payloads and Munechika's "niche market" turns out to be SDI!*

According to John Pike, of the Federation of American Scientists, the 1972 Anti-Ballistic Missile Treaty with the former Soviet Union precludes export of SDI technology to other countries. SDI payloads can only be launched from American soil. *This is why the Munechika has a "niche market" in Ka'u.*

Alaska's Poker Flat has a similar "niche market." According to the Anchorage Daily News, Aug. 25, 1991: "Alaska may be getting into the Star Wars business and state funds are being used to . . . make it happen." State officials claimed that their first customer didn't tell them about the SDI payloads. *Like Munechika, they had only talked about launching "communication, remote sensing, and research" satellites into orbit -- they lied.*

Well, just what kind of business is Lockheed in? According to Nuclear Free America, in 1987 Lockheed was the top nuclear weapons contractor (launchers). The ranking was based on nuclear weapons prime contract awards from the Department of Defense and the Department of Energy. The data was compiled by the Federal Procurement Data Center. The SDI Monitor reported on March 27, 1992 that Lockheed was still SDI's top contractor. "According to a contractor list provided by SDIO, through the end of FY 1991 Lockheed had received . . . $1.505 billion in total contracts." On Aug. 4, 1993 UPI reported that "Lockheed . . . has started work as the prime contractor on a $600 million program for a new defensive missile, the Theater High-Altitude Area Defense system (THAAD)."

Lockheed can't launch its SDI payloads from Russia, but it could from Ka'u. Ka'u has the unique advantages of being able to launch SDI payloads into either polar or equatorial orbits, and the launches can be observed from the Air Force's telescopes on Mt. Haleakala. (On Aug. 6, 1991, the Federal Register gave the proximity to the Air Force's telescopes as the only reason for selecting Kauai to launch two SDI rockets named ZEST.) *SDI is Munechika's hidden agenda.*

Lockheed works on highly classified military systems and receives virtually all of its funding from the Defense Department, NASA and SDI. For example, On Oct. 18, 1993, Reuter's news service reported: "Lockheed Missiles and Space Co Inc, a division of Lockheed Corp, has received an $832.1 million U.S. defense contract for work on the Trident missile program, the Navy said.

"The contract is for continuing work on the accurate, multi-warhead nuclear ballistic missiles that are being deployed on U.S. Trident submarines."

In other words, nearly all of Lockeed's funding crosses the desk of the Chairman of Senate Defense Appropriations -- our very own Senator Daniel Inouye.

On Sep. 1, 1991, WHT reported that Inouye promised there will be no SDI activities on the Big Island. "I can assure you that SDI will not be involved (at the spaceport) as long as I'm here," he said. *Was Inouye lying?* Has Inouye made a little "side deal" with his SDI pals in Washington on behalf of his friends in Hawaii? Possibly a few extra bucks in one pocket to cover a little shortfall in the other?

#3 -- A COMMERCIAL SPACEPORT IN KA'U WOULD RESTRICT ACCESS AND WOULD BE SUBSIDIZED BY TAXPAYERS

According to the Dec. 1989 "Nissho Iwai" study of the Japanese launch market between the years of 1994 to 2003 (page II - 14):

1. All merchandise brought into the launching site should be exempted from customs duties and state and federal taxes.
2. Customs regulations applicable to the launching facility should be as non-restrictive as possible.
3. Foreign citizens required for payload processing, launching and other specific but temporary activities within the launching facility should be permitted temporary immigration without lengthy or complicated procedures.
4. Retail and wholesale sales should be permitted within the launching facility for the purpose of promoting space-related products, services, and other space-related activities.
5. Security of the launching the should be well maintained. Because of its special situation as the first commercial rocket launching facility in the world, security for proprietary technologies and computer software must be thoroughly considered.
6. *In order to attract both foreign and domestic space-related industries, taxation and financing inducements should be proposed.* [italics added]

Since the Kennedy Space Center is designated as a Foreign Trade Zone (FTZ), it would be a practical approach for the State of Hawaii to have its launching site designated as a FTZ sub-zone. *Additionally, in view of the existence of worldwide competition in subsidized commercial rocket launching activities, it is recommended that additional incentives be created to insure that the Hawaiian launching facility be attractive and competitive for use by Pacific Rim and other countries throughout the world.* [italics added]

Accordingly, Governor Waihee has pledged to assist Lockheed "to the maximum extent possible." Mufi Hannemann, Waihee's spokesman, wrote to Lockheed on May 18 1993:

As you are aware, one of the primary, long-term goals of Governor John Waihee's Administration is the development of a commercial space launch facility on the Big Island of Hawaii. Therefore, we are most desirous of assisting private industry to the maximum extent possible in the creation of such a commercial spaceport. To that end we will:

(1) develop a programmatic environmental impact statement (EIS) which will satisfy both state and federal governments;

(2) to the extent feasible, support the mitigation of EIS issues that relate to off-site infrastructure;

(3) to the extent possible, provide off-site infrastructure support to the Hawaii Spaceport (HSP);

(4) assist with the problems related to necessary land acquisition and land use permits so as to minimize land use costs and issues;

(5) assist in the consideration of various means of funding infrastructure improvements, including the use of general revenue bonding and/or tax relief incentives;

(6) assist in the establishment of a foreign trade zone designation for the HSP;

(7) support Lockheed Missiles & Space Company, Inc. (LMSC) in its efforts to develop an HSP business/financing plan, including the possible establishment of a domestic/international consortium;

(8) cooperate and support LMSC in seeking appropriate federal funding including, but not limited to, Defense Conversion Grants.

The State of Hawaii will not seek other developers while LMSC is actively pursuing its project, and will instead, seek to assist LMSC to the extent permissible in reaching its goal of developing a commercial spaceport in Hawaii.

We welcome the opportunity of working closely together on your HSP project in order to advance our mutual goals.

According to the Anchorage Daily News, Sep. 4, 1993, Poker Flat has just become a Foreign Trade Zone:

The U.S. Department of Commerce has approved a request by the Fairbanks Industrial Development Board for a general purpose Foreign Trade Zone designation, Sen. Ted Stevens said Friday. The zones are restricted-access sites in or near ports of entry operated by the U.S. Customs Service. The designation covers three sites in the greater Fairbanks area: Fairbanks International Airport, the University of Alaska's Poker Flat Research Range and the North Star Industrial Park.

According to the Anchorage Daily News, Jan. 22 1993, Poker Flat is looking for taxpayer subsidies for its "commercial" spaceport:

The state's fledgling Alaska Aerospace Development Corp. will team with Florida's commercial space agency to seek a $10 million Air Force grant to develop new launch facilities, said Pat La director of the Alaska space agency. The grant money was included in the Defense Department appropriations bill for 1993 by Alaska Sen. Ted Stevens. His press aide, Mitch Rose, said the grant is competitive no state or entity will get preferential treatment. Ladner, a retired Air Force launch director hired last year to run Alaska's new space agency, said Alaska and Spaceport Florida will jointly apply for the money to develop standardized launch pas. Currently, most such facilities are one-of-a-kind rigs, he said. Alaska is trying to expand launch and other commercial space activities at the Poker Flat Research Range near Fairbanks.

Please read the following article carefully, then ask yourself if it could happen in Hawaii? According to the Anchorage Daily News, Aug. 13 1992:

A proposal to use $3 million in state funds to help launch a commercial rocket in California gained momentum Wednesday when Alaska's new space agency tentatively approved the deal.

The action came after more than three hours of sometimes spirited debate among board members of the Alaska Aerospace Development Corp. For most, two big questions loomed: Does Alaska, by staking the California launch, really have any hope of sparking a commercial space industry here? And, is it smart to invest $3 million in an Outside company while its Poker Flat launch pad, near Fairbanks, is still years and millions of dollars away from being able to send payloads into orbit?

Jerome Komisar, president of the University of Alaska and chairman of the space agency, said Wednesday a special committee will work to answer those questions over the next few days. For now, the agency just wants to make it clear it's interested in doing the deal.

"We feel Alaska has a role and a future in the aerospace industry," he said. "But we want to make certain there's a good chance Alaska will benefit."

The $3 million wouldn't actually come from the space agency, but from the Alaska Industrial Development and Export Authority. That state agency's board voted July 31 to give $3 million to the Aerospace Development Corp., which in turn may loan the money to International MicroSpace Inc. so long as a satisfactory deal could be reached.

AIDEA retains final say-so on the deal. Its board members, including Chairman Jack Jessee, said they want to make sure the project could, someday, create new jobs and other economic benefits to the state, in keeping with AIDEA's mission.

Executives with International MicroSpace, a 3-year-old company based in Virginia, have said their plans definitely could create jobs in Alaska. Details on how, though, remain sketchy.

MicroSpace officials could not be reached for comment late Wednesday on the Alaska space agency's vote.

In July, the company won $12.6 million defense contract to launch a test rocket as part of the Strategic Defense Initiative, or Star Wars, program. That first launch, scheduled for March 1994, would be done at Vandenberg Air Force Base in California. Company officials have said that, to keep the contract, they must secure the $3 million loan from the state.

Peter Diamandis, founder of the company, said last month the defense contract has options for nine more launches, and some of those could happen at Poker Flat in Alaska if it is upgraded. The company also is hoping to cash in on the chance to launch dozens of microsatellites as part of a worldwide communications network.

Alaska offers some advantages as a launch site, various government and MicroSpace officials say. Putting satellites into polar orbit, as opposed to sometimes less desirable orbit over the equator, is difficult in most other parts of the country because north and south flight paths would take rockets over heavily populated areas. Also, the Poker Flat range isn't controlled by the military, and that could allow it to be more responsive to commercial interests.

Glenn Olds, Alaska's natural resources commissioner and a member of the space agency board, said Wednesday he was "just appalled" that there would be any reservations about investing the $3 million in International MicroSpace. He said the potential for a clean, new industry is too good to pass up.

But another space agency board member, state Sen. Arliss Sturgulewski, R-Anchorage, said the state must be prepared to invest far more than $3 million to overhaul Poker Flat. The range, operated by the University of Alaska Fairbanks, now is suitable only for launching small research sounding rockets that don't go into orbit.

Sturgulewski also noted that the state once spent huge sums to try to spur another industry, agriculture, and it failed miserably.

Chuck Kline, associate director at the federal Office of Commercial Space Transportation in Washington, D.C., said MicroSpace's Star Wars contract is impressive. He said MicroSpace is one of a handful of companies trying to do something that, until only two or three years ago, was done only by the military and NASA [missing text] launch things into orbit.

Several other states are trying to build space industries, including Hawaii, California, Florida, Alabama, Virginia and New Mexico, Kline said.

Didn't we hire a retired Air Force Col.? According to the Anchorage Daily News, June 20 1992:

Alaska's Aerospace Development Corp. has hired its first director to try to make deals bringing commercial rocket launches to the Poker Flat Research Range near here.

Retiring Air Force Lt. Col. Patrick Ladner will take the $98,000 a year job starting Aug. 1, that a meeting Thursday.

"This job gives me an opportunity to let me continue to do the work I'm doing now launching rockets and putting deals together," said Ladner, 44, of Alexandria, Va.

Ladner is retiring from the Air Force, where he has been assigned to the Strategic Defense Initiative Organization since November 1988.

The aerospace corporation is a public body that is part of the state Department of Commerce and Economic Development was created in 1991 to encourage commercial rocket launching at the University of Alaska's Poker Flat Research Range. Poker Flat is a 5,132-acre site about 30 miles northeast of Fairbanks.

Poker Flat's first commercial "guided missle" was for the military. According to the Anchorage Daily News, Mar. 31 1992:

Scientists at Poker Flat Research Range said they were savoring success Monday after a weekend launch of "Spirit II", a military research rocket that was the center's first-ever guided missile.

The 17,000-pound, 47-foot missile was designed to observe infrared light emitted by the northern lights. It went up at 11:07 p.m. Saturday.

Spirit II flew nine minutes and looked down on the aurora in western Canada from a vantage point 200 miles above the Earth. The rocket collected about 71/2 minutes of data before making a parachute landing at a site 10 miles north of the launch pad, on research range land near Beaver.

The site was just seven miles from a projected target, researchers said Monday.

"It kept to its path and did what it was supposed to do," said Vernon Baker, the project scientist who guided the guided-missile launch and gave the word for Saturday's liftoff.

"Exuberance is the feeling around here," Baker said.

The launch, funded by the Air Force, gathered enough data to keep scientists busy for more than a year.

The information may be useful in programming satellites used in the Strategic Defense Initiative project, also known as "Star Wars."

Military researchers study atmospheric disturbances such as the aurora to see if SDI satellites could tell the difference between an incoming warhead and naturally occurring clutter.

Saturday's launch marked the end of a three-month wait, since it required a good aurora display as well as clear skies over Poker Flat. Good weather at two observatory sites on the ground also was needed.

The next chance for good launch conditions would not come until October, Baker said.

Spirit II lifted a telescope into the heavens that looked down on the aurora and simultaneously sent back pictures that could be seen in the Poker Flat control room. It was guided by four computerized exhaust nozzles that directed the rocket the way a steering wheel turns a car.

The payload was equipped with a locator device and was recovered. Parts of it may be reused. The rocket remained Monday at the landing site.

Poker Flat is a 5,100-acre range 30 miles northeast of Fairbanks run by the University of Alaska. It has launched more than 1,500 meteorological rockets since it began operating 23 years ago.

All of those missiles were unguided and stayed on course by turning end over end like a football lobbed a long distance.

As payloads get heavier, guided missiles are required since they can pack more thrust. Spirit II's payload weighed 2,770 pounds.

Jim Strandberg, the research range director, said Monday he missed Saturday's launch, but compared the spectacle to shooting a small car into the night sky.

"This would be very, very impressive," he said.

"It's dark out and the vehicle reaches 4,000 feet in the first six seconds. Imagine how fast that is."

In fact, the launch was visible from Fairbanks, Strandberg said.

Spirit II was directed by scientists from Hanscom Air Force Base near Boston.

A successful guided-missile launch may also be of strategic importance to Poker Flat administrators.

The research center, the only one of its kind in the country that is not managed by the federal government, is a focus of the Alaska Aerospace Development Corp.

The state-backed entity is responsible for luring commercial launch companies to Alaska.

Strandberg said Monday that the guided-missile launch showed Poker Flat had matured, although there were no immediate plans for a similar project.

"As payloads get larger, we have to go to guided missiles to support them. It's an inevitable next step," he said.

#4 – THE PEOPLE DON'T WANT A SPACEPORT IN KA'U

On April 18, 1990, West Hawaii Today (WHT) reported the results of a survey commissioned by Senator Andy Levin, and Representatives Virginia Isbell and Jerry Chang. The survey showed that a clear majority of Hawaii County residents opposes a spaceport. Opposition to a spaceport by district was 76% in Puna, 75% in Kona, 74% in Ka'u, and 57% in Hilo.

Moreover, the spaceport EIS team circulated a questionnaire in the Ka'u district. The results of that survey appear in Volume IX, Appendix C of the EIS. A summary of the major findings is as follows:

1. In terms of preferred economic options for the Ka'u region, respondents favored diversified agriculture, small businesses and commercial fishing. The least preferred options were a spaceport, resorts and tourism, and aquaculture. Community-based economic development was also considered a viable alternative for Ka'u.
2. In the area of social planning and community issues, respondents strongly believed that the rural lifestyle of Ka'u should be protected, there should be protection for Hawaiian customs, beliefs, and practices, and that subsistence practices should be protected. On the other hand, respondents felt that Ka'u lacked sufficient human services, housing, and infrastructure
3. When respondents were asked if they favored or opposed a spaceport, 20% favored it, 13% were undecided, and 65% were opposed. Two percent stated that they were waiting to read the EIS before deciding.
4. Respondents speculated that a spaceport would have the following social impacts: cause social disruption, pose health and environmental risks, provide new employment opportunities, and lead to lifestyle changes.
5. The qualities of Ka'u that respondents felt should be preserved included its lifestyle, open space and shoreline, historic and archaeological sites, and fishing and gathering grounds.
6. When respondents were asked about the types of changes they would like to see in Ka'u, 21% stated "nothing at all", 18% stated infrastructure, 16% stated public education, and 11% stated land tenure/ownership.
7. Attitudes favoring and opposing a spaceport were analyzed according to demographic subgroups. In terms of age differences, younger people expressed the strongest opposition to a spaceport. Although a majority of respondents in both gender categories opposed a spaceport, men exhibited more support for it than women. Hawaiians expressed the strongest opposition to the spaceport, although Caucasians and Filipinos also expressed opposition. The only ethnic

group to support a spaceport was the Japanese. Individuals in the low income groups expressed the most opposition to the spaceport, while the highest income group expressed the most support for it.

On May 28, 1993, WHT reported that Governor Waihee said "if residents of the Big Island don't want a spaceport, we won't ram it down their throat." *Was Waihee lying?*

#5 – STATE-SPONSORED ECONOMIC DEVELOPMENT HAS NOT HELPED THE WORKING-CLASS

One never asks: development towards what? Despite the intense economic development of the last 20 years, what exactly has *developed?* Who claims that our schools, infrastructure, economic security or taxes are any better? Why would any rational individual want any more of this *development?*

For example, common sense tells us that those who are developing our county for profit should pay the public infrastructure costs (roads, water, schools, etc.) that are associated with their profit-making projects. It is clearly unfair to force the tax-paying residents to subsidize private developers (it's welfare for the rich). But in the past, passing infrastructure costs along to the public has been a favorite way for politicians to help their rich developer pals maximize their profits.

A 1990 report, issued by the Hawaii County Public Works Department, lists a total of $558 million worth of planned projects. Yet the county's budget for this infrastructure is only about $4 million per year. In other words, we are over 100 years behind in our county infrastructure and county tax-payers of this county owe an infrastructure debt of $558 million! How far behind are we in state projects? Is this stupidity or corruption?

Furthermore, have these past 20 years of economic development improved the economic condition of the working class? Hardly! Despite this intense development, real income has declined precipitously. Isn't this un-economic development? Do we really want more of the same?

If you don't believe that our government has sold out the working class people, consider these long-term economic trends as articulated by Hawaii's Special Assistant to the Governor for Economic Affairs, Gregory G. Y. Pai, Ph.D.:

> To begin with, we are all aware of the transformation of Hawaii from an agrarian plantation society into a tourist-oriented service economy during the roughly three decades since Hawaii became a state. In spite of the unprecedented economic growth and prosperity that resulted, an important consequence was that the labor force was transformed from one primarily craft and skill oriented to one predominantly sales and service oriented. Because of the historically lower wages paid to trade and service jobs, the result was a long-term decline in wage and income growth in the state. By 1982, Hawaii's rank in terms in annual wages paid per employee had dropped to 42nd in the nation. Given Hawaii's traditionally high cost of living, the result was greater pressures on families in the struggle for economic survival. In the two decades between 1969 and 1989, the median income of households in Hawaii, adjusted for inflation, increased by 43 percent from $27,094 to $38,829. However, the consumer price index for Honolulu, which measures price increases for household expenditures such as food, clothing, shelter, energy, transportation, and medical care grew by 227 percent during the same period. Thus, the costs of living in Hawaii, in the last two decades, grew at a rate five times faster than the growth in income for Hawaii households. Analysis of 1990 Census data also reveal a trend toward an increased bi-modal distribution of household income. In short, the rich have continued to get richer while the poor have gotten poorer.
>
> This deterioration in economic welfare for Hawaii's families is graphically reflected in long-term statistics on social welfare expenditures. Despite the impressive growth in

Hawaii's overall economy, total state government social welfare spending increased dramatically from $24 million in 1967 to $434 million in 1990. Individuals receiving social welfare payments doubled from 22,400 to 52,000 persons. Between 1989 and 1990, recipients of aid to families with dependent children, child-welfare foster care, and general welfare assistance grew from 7,073 to 33,652 cases, while the level of monthly payments increased from $14 million to $176 million. In the meantime, households receiving food increased from 1,500 to 32,000, while the annual value of food stamps distributed rose from one million dollars to $79 million.[1]

#6 -- THE AEROSPACE BUSINESS IS NOT A GROWTH INDUSTRY

According to the Miami Herald, Jan. 6, 1992: "Spaceport Florida, touted as a profitable 'gateway to the stars' when announced in 1989, is in such deep financial trouble that it could be grounded permanently. . . For one thing, the market for commercially financed rocket launches has shrunk. . . . The agency has conducted only one launch: a state-funded suborbital flight from Mexico in July to study a solar eclipse. The instruments carried on the flight failed to work." *Someone lied! If the State of Florida can't make a commercial spaceport a financial success, what chance does the State of Hawaii have?*

On June 14, 1993, Investor's Business Daily reported:

Since 1990, California has lost between 552,700 and 900,000 jobs. That's more than the entire population of Seattle. And economists expect the state to lose another 150,000 jobs this year.

Probably the biggest blow to the state will come from Clinton's cuts in military spending.

Throughout the 1990s, California benefited more from the nation's military buildup than any other state, receiving an estimated 20% of all defense-related dollars.

So it's not surprising that California would be hit hardest by the post-Cold War defense cuts. The fact that Clinton has chosen to speed up the build-down only makes it harder for the state.

The California Commission on State Finance estimates that the state lost 162,000 jobs between 1988 and the end of 1992 because of defense cuts. That includes 140,000 civilian jobs in the aerospace industry.

The commission further estimates that California will lose 125,000 more jobs over the next four years because of defense cuts.

On Oct. 1, 1993, UPI reported:

Lockheed Missiles & Space Co. said Friday it will go through with cutting about 1,400 more jobs from its work force by the end of the year.

The operation, a unit of Lockheed Corp., has already cut about 1,800 jobs this year to bring employment to about 19,600, including 15,000 in the San Francisco Bay Area.

Spokesman Robert Burgess said Lockheed, which had previously set a goal of cutting 3,200 jobs by the end of the year, plans to begin sending out 60-day layoff notices for the 1,400 jobs next week. About three-quarters of the layoffs will occur in the San Francisco Bay area.

1 "The Long-Term Outlook for Hawai'i's Population and Economy"
-- Pai address at the 1993 United Way Symposium (March 12, 1993)

12-355

The unit, headquartered in the Silicon Valley community of sunnyvale, already cut 1,308 jobs in summer 1992, when it offered early retirement to 3,200 employees.

Lockheed Missiles, which produces missiles for the Trident II submarine and works on classified missile and satellite systems, receives virtually all of its funding from the Defense Department and NASA -- both of which have cut spending in recent years.

#7 -- SDI IS NOT PROTECTION AGAINST NUCLEAR WEAPONS

PRO: **Remnants of the Soviet Union may accidentally launch an intercontinental ballistic missile (ICBM) at us and we would need our SDI anti-ballistic missile (ABM) to shoot down their ICBM.**

CON: Dr. Sherman Frankel proposes a much better solution to the problem in an article titled "Stopping Accidents After They've Happened", which appeared in the Nov. 1990, Bulletin of the Atomic Scientists.

Nuclear missiles have sophisticated electronic locks called "permissive action links" (PALs), and require special codes before the missiles can be launched. Unfortunately, once they are launched, there are presently no mechanisms in place to destroy errant nuclear missiles.

Dr. Frankel proposes a new system that would be able to destroy missiles after they have been launched, and would be similar to systems that are presently used on all commercial rockets. The principal innovation is that the new post-launch system would have a unique secret destruct number stored in each missile. Each missile's secret number would be changed frequently to guard against espionage. There would be one PAL to launch the missile and another PAL to destroy it.

Dr. Frankel's system would be far cheaper, quicker to implement, and much more reliable than the proposed SDI ABM system. Dr. Frankel is a professor of physics at the University of Pennsylvania in Philadelphia and is completing a book about post-launch control of nuclear weapons.

PRO: **Saddam Hussein may get a nuclear weapon to destroy one of our cities and get even for Desert Storm. Thus, we would need SDI's ABM to shoot down Saddam's ICBM.**

CON: Dr. Robert Bowman lectured in Hawaii during 1990 and made the following points concerning nuclear terrorism:

If the past is any guide to the future, nuclear weapons will indeed become more and more likely to fall into the hands of terrorists. However, even if crazy Saddam manages to steal a nuclear weapon, he still will not have ICBM technology. Moreover, if someone gave Saddam an ICBM to launch his weapon, why would Saddam risk his precious nuclear weapon on an untested ICBM? Perhaps, the single most important reason not to use an ICBM is that as soon as a missile trajectory originating from Iraq appeared on our radar screens, we would certainly retaliate.

Wouldn't Saddam be more likely to place his bomb in a boat and simply sail into any handy American seaport? Come to think of it, we have a pretty good selection to choose from right here in Hawaii. Saddam couldn't possibly miss, and no one would ever know where it came from. Instant glass...

In reality, we must stop the proliferation of nuclear materials and technologies in order to protect ourselves against nuclear terrorism.

PRO: **We can stop worrying about nukes once we have SDI.**

CON: Even SDI proponents no longer consider this a rational argument, because *there really is no defense against a nuclear weapon in the hands of a terrorist.*

#8 -- MILITARY SPENDING COSTS MORE THAN MONEY

Recent news articles have pointed out that billions of dollars have been spent on SDI projects which have been subsequently abandoned. I think readers will admit that wasteful spending of our tax money is wrong. Moreover, most of us can understand that someday we are going to have to pay for the federal spending binge. However, seldom do we hear about the social impacts of dedicating such a large fraction of our wealth to the international arms race.

Consider the impact on jobs: according to "State of The World", by Lester Brown, "The continued belief in the myth of military-led prosperity has obscured the fact that civilian spending creates significantly more jobs. In the United States, spending $1 billion (in 1981 dollars) on guided missile production creates about 9,000 jobs; when producing military aircraft, it creates 14,000 jobs. But spending the same amount on local transit would yield 21,000 jobs; and on educational services, 63,000 jobs."[2]

Consider the impacts of the international arms race on infants: in 1985, a group of medical professionals from Harvard Medical School studied the impact of military spending on infant mortality in 141 different countries. The studies showed a relationship between the proportion of gross national product (GNP) devoted to military spending and infant deaths.

The study suggests that every 1% of GNP devoted to military spending results in 3.29 infant deaths per 1,000 live births. In other words, approximately two million deaths among the 125 million infants born each year are due to the 5% of the world GNP spent on the military.[3]

If the statistical argument is a sensible one, in 1987 the deaths of 1,211 American infants were due to expenditures on SDI. *In other words, Missiles kill before they explode.*

Former US President Dwight D. Eisenhower warned: "Every gun that is made, every warship launched, every rocket fired signifies, in a final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed.

"This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children...."

And, it is spending the lives of its infants.

#9 -- A SPACEPORT IN KA'U COULD BE BAD FOR EXISTING BUSINESS

A recent Star-Bulletin editorial bitterly complained that the SDI protesters on Kauai were jeopardizing the military bases in the State. Anyone familiar with Big Islanders knows that protesting will steadily intensify if the OSI moves forward with its SDI spaceport. The increasing hostility towards military activity places even more pressure on the bases (happening now with Kauai). Whether or not the additional hostility would be enough to push the military over the edge, remains to be seen. *Conceivably, the OSI's "economic development" could be the most "un-economic development" in the history of the State.*

2 "State of the World 1990" -- Brown et al.

3 "International Health: Militarism and mortality.
An International Analysis of Arms Spending and Infant Death Rates."
-- The Lancet, No. 8442, Jun. 15, 1985..

#10 -- CBED IS ONE ALTERNATIVE

The State of Hawaii has at least one good idea: CBED. Instead of the "Autocrats R Us" approach of OSI, CBED starts with the goals and wishes of the community.

The State of Hawaii's Community-Based Economic Development (CBED) program is a development process that brings a community's vision together with the requirements of economic feasibility. Its emphasis is on asserting community control and power over local resources and decision-making processes. By allowing localities to determine for themselves the course of their own development path, a natural element of resilience is built into the process because the people have ownership of that vision and are more likely o act upon it. CBED is ultimately about investing in human development hat results in economic ventures that are consistent with a community's values, culture, and vision.

Communities become FULL partners in the development process!

FINDINGS

There is no market for a spaceport in Ka'u to launch "civilian" payloads. But of course, with enough state and federal subsidies it becomes economical to launch military payloads. Both Governor Waihee and Senator Inouye appear to be lying. The people clearly don't want a spaceport of any kind in Ka'u.

As Col. David Hackworth, the most decorated Army officer in Vietnam has said: "America's real enemy is now within our shores -- flawed military thinking, self-serving congressional porkers, greedy lobbyists and corrupt defense contractors."[4]

Hackworth is right! America's real enemy is now within our shores. Stop the spaceport!

Jay Hanson, Hawaii County Planning Commissioner
78-6622 Alii Drive, Kailua-Kona, HI 96740
Phone/FAX: 322-7268 Phone: 322-7951or 329-6645 FAX: 329-6523

4 "A Pentagon in Dreamland" -- Hackworth
-- The Washington Post, Feb. 23, 1991.

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGERS
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
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SEP. 30 1994

Mr. Jay Hanson
78-6622 Alii Drive
Kailua-Kona, HI 96740

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Hanson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-357

KRP Information Services and Decision Analysts Hawaii, Inc. contributed to this response.

Comment: *There is no market for a spaceport.*

Response: Historically, successful economic development occurs within a context of comparative economic advantage. As explained in the Conceptual Plan and Project Description for a Commercial Satellite Launching Facility in the State of Hawaii (February 1993), the principal comparative advantage offered by Hawaii is that a single launch facility can be used to place satellites into both equatorial and polar orbits. On the mainland, a new launch company must build and maintain two expensive launch facilities: one in Florida for equatorial launches, and one in California for polar launches.

This comparative economic advantage for Hawaii has attracted the interest of companies that wish to take advantage of recent advances in rocket-launching technology and have plans to place large constellations of communication satellites in low-earth orbit. These companies would be the likely market for a Hawaii launch facility. It should be emphasized, however, that the military already has extensive infrastructure investments in the two national ranges and would not be interested in the Hawaii site, even though the facility would allow both polar and equatorial launches from a single site.

The promotion of Hawaii's comparative economic advantages--combined with State and County assistance in securing the necessary development approvals--is the same approach that was used so successfully in attracting the astronomical telescopes to Mauna Kea.

Comment: *Lockheed will launch SDI (Star Wars) Payloads*

Response: Lockheed Corporation has no present plans to develop a commercial rocket launching facility in Hawaii.

Comment: *Spaceport would restrict access and be subsidized by taxpayers.*

Response: The Spaceport is planned as a commercial development that would not require subsidies from taxpayers. Furthermore, the fiscal analysis in the dEIS, Appendix IXA, Chapter 8 reveals that Spaceport would bring a net financial gain to the State and the County.

Regarding financial inducements to attract space-related industries, this would likely be in the form of State provided tax-free/low-interest revenue bonds. However, the debt would be serviced by the Consortium and/or launch companies, and not the State.

Regarding tax inducements to attract space-related industries, this could be an exemption to the State excise tax if possible. If granted for the entire spaceport

operations, net tax revenues to the State would decrease by an estimated $1.2 million (4 percent of $31 million), from about $4 million to $2.8 million. Even if this exemption were granted, the State would still realize a net gain.

Comment: *People don't want a spaceport in Ka`u.*

Response: The State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project. The private developer would prepare a Supplemental EIS.

Comment: *State-sponsored economic development benefits few at the expense of many.*

Response: See response to your third comment.

Comment: *Aerospace is not a growth industry.*

Response: Based on the Conceptual Plan, estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the estimated number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The Hawaii Spaceport would be built by a private interest (possibly an international consortium), not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: *SDI is no protection against nuclear weapons.*

Response: The launch facility would not military, it would be a private enterprise.

Comment: *Military expenditures are not efficient use of money within the economy.*

Response: As noted above, the proposed launch facility would be a private commercial enterprise, not a military or SDI facility.

Comment: *The Spaceport could be bad for existing business because of opposition to an SDI spaceport and increasing hostility towards military activity.*

Response: We respect your opinion, however, as mentioned above, Spaceport would be a commercial rocket launching facility, not a military or SDI facility.

Comment: *Community-based economic development is preferable.*

Response: It would indeed be desirable for the residents of Ka`u to continue to pursue community-based economic development (CBED), as they are doing now. This approach is consistent with the history in the United States, where most successful development is achieved by local entrepreneurs who receive little or no direct government assistance. Nevertheless, government can still play a pivotal role in facilitating development that is beneficial, yet cannot be spawned from resources within a community. On the Big Island, the Mauna Kea Observatories may be the best example of this.

Furthermore, a development such as launch facility, if successful, would benefit CBED by expanding opportunities for local entrepreneurs (see Appendix IXA, Chapter 5, p. 5-2). New opportunities would be presented to supply goods and services to companies and workers at the launch facility, existing Ka`u residents who would have more spendable income, new residents, and visiting workers.

In pursuing CBED, the goals and wishes of Ka`u residents are obviously critical, but in the process of setting their goals, residents must consider which activities are economically feasible in Ka`u, given its remote location, distance from markets, and its limited support services for businesses. Simply put, for most new business activities, Ka`u does not offer a comparative advantage over other places in Hawaii; in most cases, it would be more profitable for economic activity to locate elsewhere.

For example, diversified agriculture is often mentioned for CBED by residents throughout the State, not just by those who live in Ka`u. The best place in Hawaii for most crops, however, is Central Oahu on lands currently being released from sugar production by Oahu Sugar Co., Ltd. Such lands are among the best farm lands in the State: soils are deep with good machine tillability, the area is very sunny, and an ample supply of very low-cost water is available. Furthermore, these lands are ideally located for agriculture due to their proximity to the large Honolulu consumer market, to supply markets, and to overseas air and surface shipping terminals. Thus, for most crops, Central Oahu has a strong comparative advantage over Ka`u. Crops will indeed be grown in Ka`u, but the opportunities will be limited by comparison to Central Oahu.

Overall, it is difficult to be optimistic about the prospects for full employment in Ka`u, even if both CBED and the launch facility are realized (see Appendix IXA, Chapters 3, 4, 5, and 6). Ka`u needs jobs for existing unemployed workers, for those who will be laid off soon from Ka`u Agribusiness Co., Inc., for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. Resorts are a possibility, but after many attempts over the years, significant resort development has yet to be realized in Ka`u. And while diversified agriculture is expected to expand, it will not be sufficient to provide full employment.

Governor, State of Hawaii
c/o Office of Environmental Qualit Control
220 South King Street
Honolulu, Hawaii 96813

P-C # 93351-B
From: Director's Office
To: [redacted]
Coordinate with:
IC: TY TB MH
— Draft reply for Governor's signature
— Draft reply for Director's signature
— Direct reply (co/bon Director)
— Comment/Recommendation
— Follow-up/Report
✓ Your information/file
— Keep enclosure(s)
— Return enclosure(s)
— Other
Due Date

Re: conceptual plan for a 'spacepo: ' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptanc. or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEM. .T (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely, Meghan M. Harper

Signature: Meghan M. Harper Date: 12/01/93

Name and address:
78-6629 Alii Dr.
Kailua-Kona, HI
96740

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th Floor
Honolulu, Hawaii 96813

12-359

JOHN W
GOV
JEANNE K. SCH
DIR
RICK EC
DEPUTY DIRE
TAKESHI YOSHI
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Meghan M. Harper
78-6629 Alii Drive
Kailua-Kona, HI 96740

Dear Ms. Harper:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-360

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Janie I. Henderson Date: 11/22/93

Name and address: JANIE I. HENDERSON
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Cc:_ Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
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Honolulu, Hawaii 96804

-State of Hawaii, Office of Environmental Quality Control
220 South King Street, Fourth Floor
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12-361

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DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

SEP. 30 1994

Ms. Janie I. Henderson
403 Mauna Loa Shores
Hilo, HI 96720

Dear Ms. Henderson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-362

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Janet Hotchkiss Date: 11-21-93

Name and address: JANET HOTCHKISS
28-2970 KUMULA D27
PEPEEKEO, H. 96783

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-363

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN W. GOV. JEANNE K. SCH DIR RICK E. DEPUTY DIR TAKESHI YOSHI DEPUTY DIR

Central Pacific Plaza, 220 South King Street, 11th Floor Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

Ms. Janet Hotchkiss
28-2970 Kumula D27
Pepeekeo, HI 96783

Dear Ms. Hotchkiss:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

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Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Sunday
Oct. 31, 1993

I voted for you, Governor but am quite disappointed in your posture concerning the proposed Spaceport on the Big Island.

A few years ago, I tried to see you regarding this but your schedule was much too busy.

On Oct 29th, DIALog had discussion on the Spaceport. I called in my question to this TV show and I wish to present it to you for your serious contemplation.

BESIDES the very VALID facts that not only is it too windy there (at proposed site) the very real and extremely dangerous radiation hazards and accident potential will always loom as a deadly threat to humans and our delicate ecology. It should be evident that if a blast off occurs our clean air will definitely be polluted. The noise will disturb the fish and fishing

12-365

2

It's obvious that in actuality, not that many jobs will be provided and constuction jobs are only temporary.

Hawaii has the most EXCELLENT telescopes and EXPENSIVE observatories on the planet. Activity at a spaceport will pollute the air with particles and OBSCURE the observatories view. Please do not permit all these negative impacts to occur. Hawaii is too precious.

What I wish to express to you is that Hawaii (Big Is.) IS the most volcanically active place ON EARTH. It has been so for over a DECADE.

Why is such an extremely unstable site even considered?

It's a fact that scientists are not able to predict eruptions. These violent disturbances in the EARTH'S crust are totally unpredictable. This is a supreme example of a present and future geologic hot spot of gross instability.

I think to build on such an obviously poor and changing and unstable foundation is unthinkable

I'm sure you are, by now, aware that the majority of Big Is residents are opposed to a spaceport.

EARTHQUAKES and volcanic eruptions will occur into the future. Such a project belongs on stable earth and Hawaii will never be able to offer a stable base or solid foundation for such a massive and quite costly project

The safety and well being of our people and environment is at stake.

Alternative sites in other parts of the world are available.

Ultimately, a changing and geologically unstable foundation exists on the Big Island and this alone should convince anyone that this obviously is the wrong location for a spaceport.

Again, I ask for your serious contemplation of this vital matter

Mahalo,
Ann Fulop

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii 96813
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SEP. 30 1994

Ms. Ann Hulyk
3164-A Kalani Place
Pukalani, HI 96768-8337

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Hulyk:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-368

Comment: *Besides the very valid facts that not only is it too windy (at the proposed site) the very real and extremely dangerous radiation hazards and accident potential will always loom as a deadly threat to humans and our delicate ecology.*

Response: The potential effects of an accident on both human beings and the ecology are thoroughly described in the two risk assessment documents included in the Volume VIII of the dEIS (Appendix A and B) and summarized in Volume I, Chapter Five. There will be no dangerous radiation hazard because spacecraft powered by radioactive materials are prohibited by State law (Section 201-75, Hawaii Revised Statutes). As to your comment about the site being too windy, surface winds are not as significant to the determination of whether or not to hold a launch as upper winds. In addition, wind is very important in the diffusion and dispersion of toxic chemicals. The worst case for toxic dispersion is when there is little or no wind at all.

Comment: *It should be evident that if a blast occurs, our clean air will be polluted.*

Response: Launch exhaust emissions are evaluated in Volume I, Chapter Five of the dEIS. Although there would be temporary impairment of air quality immediately after a normal launch and following a launch failure or explosion, all exhaust emissions would be intermittent and of short duration, therefore, impacts to air quality are not expected to be significant. As stated in the dEIS:

> *"Overall, the nitrogen oxides (NO_x), aluminum oxides (PM_{10}), and CO emissions are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Cumulative impacts on air quality from launch operations are not anticipated to be significant because of the intermittent nature of the vehicle launches."*

Comment: *The noise will disturb the fish and fishing.*

Response: Noise impacts are discussed in the dEIS in Volume I (Chapters Four and Five), Volume II (Chapter Seven) and Volume VII (Appendices B through E). There has been no evidence of harm to fishes from noise in the operational experience of launches of rocket vehicles at Cape Canaveral in Florida or at Vandenberg Air Force Base in California.

It should be noted that there are numerous examples of where vibration and noise are emitted into the nearshore marine environment with no discernible impact on marine species. For example, earthquakes which may be severe; these have occurred from time immemorial with no discernible effect. In addition, an example where the perturbation is from an anthropogenic source is at Keahole Point where the pumps for the 12-inch and 18-inch seawater pipes are emitting a loud sound almost continuously underwater. Dr. Richard Brock has monitored fish and coral communities at Keahole Point since 1987 and has not seen a discernible impact due to the noise.

Comment: *It is obvious that in actuality, not that many jobs will be provided and construction jobs are only temporary.*

Response: The launch facility would provide a considerable number of employment opportunities for Big Island and Ka`u residents. As discussed in the dEIS Appendix IXA, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka`u.

The estimated 290 jobs for the local labor force in Ka`u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the space industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

12-369

Comment: *Air pollution will obscure the observatories view.*

Response: Stringent mitigating measures will be instituted to insure that the plume will not obscure the observatories' view. As stated in Volume I of the dEIS:

> *"It may be necessary to pass special legislation to insure that the mitigating measures are enforceable."*

Comment: *Why is such an extremely unstable site even considered? It's a fact that scientists are not able to predict eruptions. These violent disturbances in the earths crust are totally unpredictable. This is a supreme example of a present and future geologic hot spot of gross instability.*

Response: The geologic instability of the area and the risk of volcanic eruption are recognized. Hawaii is one place in the entire world where anticipation of damaging earthquakes based upon premonitory seismicity (or other precursory phenomena like ground uplift and subsidence) is likely to occur. Historical records of seismicity patterns have already been used successfully to predict major eruptions of volcanoes, including Mt. Saint Helen in Washington state, Mt. Pinatubo in the Philippines and Kilauea in Hawaii.

The State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. If and when a private developer proposes an actual project, lava flow hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

POSTED NOV 19 1993

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

'93 NOV 22 P2:41

OFC. OF ENV. QUALITY

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Phillip Jenkins Date: 11/17/93

Name and address:
PHILLIP JENKINS
P.O. Box 521
Volcano, HI 96785

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-370

JOHN W.
GOV
JEANNE K. SCH
DIR
RICK E
DEPUTY DIR
TAKESHI YOSHI
DEPUTY DIR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

Mr. Phillip Jenkins
P.O. Box 521
Volcano, HI 96785

Dear Mr. Jenkins:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I)

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Mr. Tak Yoshihara
Deputy Director
Dept. Business, Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Re: Conceptual plan for a "Spaceport" at Palima Point

November 18, 1993

Dear Mr. Yoshihara

I am writing this letter to voice my protest against the acceptance of the continuance of the "DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) regrading the conceptual plan for a spaceport at Palima Point on the Big Island.

I believe that the environmental and health hazards of nuclear and chemical fuels of the project far outweigh the benefits.

I believe Governor Waihee should discontinue this project immediately.

Yours Sincerely,

Genie Joseph

12-372

3831 A Monterey Drive Honolulu, Hawaii 96816

JOHN W.
GOV
JEANNE K. SCH
DIR
RICK E
DEPUTY DIRE
TAKESHI YOSHIH
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

Ms. Genie Joseph
3831 A Monterey Drive
Honolulu, HI 96816

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Joseph:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *I am writing to voice my protest against the acceptance of the continuance of the dEIS regarding the spaceport.*

Response: The dEIS is based upon public concerns that were raised during the scoping process. The dEIS addressed those concerns in the context of a conceptual plan. Agencies and the public used the review period following the release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address the public and agency comments raised during the public review period. The State funded the EIS to disclose the potential impacts of building a spaceport, recognizing that some unresolved issues may require supplemental studies by a developer.

There is no specific project under consideration at this time. If an actual launch project for Palima Point is proposed at some time in the future, supplemental studies relating to the specific project under consideration would be paid for by the developer.

12-373

Comment: *The environmental and health hazards of nuclear and chemical fuels of the project far outweigh the benefits.*

Response: Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The Health Risk Assessment conducted for this project (DEIS Volume VIII, Appendix A) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

KKM

SEND COPIES TO
APPROPRIATE PARTIES

FILE

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OCT 1993

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1002-A Prospect St, #28
Honolulu, Hi 96822
Oct 7, 1993

Governor of Hawaii
c/o Office of environmental Control
220 South King St, #400
Honolulu 96813

Dear Governor:

As an avid fisherman, both shore and blue water, I am concerned with and enironmental effects that the Space Launch Facility in Ka'u may have.

What effects will either chemical or nuclear rocket launchs have on the marine environment - both near shore and open ocean?

Thank you for your attention to this Health and Environmental matter.

Sincerely,

William J. King, MPH

Member Pelagic Advisory panel to WESPAC
Member Board of Directors Hawaii Fishing Coalition
Member Atlapac Fishing Club
Member Makuli Kane Kai Fishing Club

c: Ken Munechika, DBEDT

12-374

(16)

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

JOHN W.
SO
JEANNE K. SC
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SEP. 30 1994

Mr. William J. King
1002-A Prospect St, #28
Honolulu, HI 96822

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. King:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Dr. Richard Brock contributed to this response.

Comment: *As an avid fisherman, both shore and blue water, I am concerned with and environmental effects that the Space Launch Facility in Ka`u may have. What effects will either chemical or nuclear rocket launches have on the marine environment - both near shore and open ocean?*

Response: Potential impacts on both recreational and commercial fishing are addressed at length in the dEIS. Please see Appendix IXB: Commercial Fishing in the Vicinity of Palima Point and Appendix IXD: Ocean and Shoreline Recreation and Subsistence Uses. As a point of information, it should be noted that no adverse impacts on ocean fishing from rocket launches have been observed at other launch facilities such as the Canaveral and Vandenberg Air Force Base facilities. One of the best de facto wildlife preserves in the country (the Merritt Island wildlife refuge) is adjacent to the Canaveral launch facility in Florida and there have been no adverse impacts on marine animals such as sea turtles, which successfully nest at the Canaveral facility.

There will be no effects on the marine environment from nuclear rocket launches. because spacecraft powered by radioactive materials are prohibited by State law (Section 201-75, Hawaii Revised Statutes).

KKM (FYI)

September 19, 1993

RECEIVED

SEP 23 1993

Office of Space Industry
DBED

Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Governor Waihee:

You may or may not live in the district of Ka'u, part of the Big Island of Hawaii, but I believe this should concern you. Yes Ka'u is sparsely populated with lots of usable land, but what goes on in Ka'u affects the whole Big Island, the whole State, and yes our whole home, the planet Earth. Therefore, when I was talking with a fellow citizen about the rockets proposed, and asked him, "What about the environmental impact?", he replied, "That land is nothing." To me this was the most offensive of his reasonings during our conversation. This land, this district in particular, is one of the most unique places in the world, as is the whole island of Hawaii also. The bare lava rock can be made into usable agricultural land. (Yes, it really can.) The people who live in Ka'u want to maintain their rural lifestyle, and a rugged beauty that is like no other. Historically, Ka'u was where the first Polynesians landed, therefore, giving this land historical value as well.

But, to get back to the land; the land is the heart of the Hawaiian people and of the majority of people who have recently moved/migrated here to live. This spaceport cannot happen; the people here do not want their valuable land used in ways they see unfit and harmful not only to them, but harmful to you in Honolulu, and to you in Washington, D.C. The people here are working on building up job opportunities in Ka'u, but the kinds of jobs that the majority of the people here want. Keiko Bonk-Abramson is truly our representative and is working overtime with all her heart and mind, and also recruiting unpaid volunteers to help in the efforts of giving her constituents what they really want. What the majority of the people in Ka'u and of the Big Island don't want are rockets and space launching pads in Ka'u.!

Sincerely,

Alice R. Klein

Alice R. Klein
(A voting citizen of our country - The U.S.A.,
and of our great State of Hawaii)
(808) 929-8126

Alice R. Klein
P.O. Box 6448
Captain Cook, Hawaii
96704-6448

12-376

JOHN W.
SO
JEANNE K. SC
DI
RICK E
DEPUTY DIR
TAKESHI YOSHI
DEPUTY DIR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu Hawaii 96813
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

Ms. Alice R. Klein
P.O. Box 6448
Captain Cook, HI 96704-6448

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Klein:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services and Decision Analysts Hawaii, Inc. contributed to the following response

Comment: *The Spaceport will be harmful to the land and prevent it from being used for agriculture.*

Response: As discussed in Appendix IXA (pp. 5-6 to 5-15), most of the land within the Population Control Zone of the launch facility would remain available for agriculture. Furthermore, the land that would be developed has poor agronomic conditions; most of it is rocky, and an abundant supply of low-cost irrigation water is not available.

It is true that bare lava rock can be made into usable agricultural land. In fact, similar but more visible examples of this are the resort golf courses in North Kona and South Kohala. It should be noted, however, that huge amounts of lava land are available for agriculture on the Big Island; in fact, the supply far exceeds demand. The development of the Spaceport would not cause a shortage of lava land that would restrict the growth of agriculture.

More significantly, there is now an oversupply of good-quality agricultural land in Hawaii (see Appendix IXA, pp. 5-15 and 5-16) and Price of Paradise, Volume II, edited by Randall W. Roth (pp. 139 - 143), both of which show even lower acreages than are actually available due to additional plantation closings since these publications were written). Since the late 1960s, over 200,000 acres have been released from plantation agriculture, or soon will be released. Of this, over 160,000 acres remain available for alternative crops. In terms of agronomic conditions (good soils, sunny conditions, ample supply of low-cost water) and location (near the large Honolulu consumer market, near supply markets, and near transportation terminals), the best agricultural land available for alternative crops is not in Ka`u, but in Central Oahu on lands being released from sugar production by Oahu Sugar Co., Ltd.

Comment: *The majority of the people in Ka`u and the Big Island oppose the Spaceport.*

Response: As noted in the cover letter, the State does not anticipate further active participation in the launch site initiative at this time. Development of the facility by private industry would only occur if driven by sufficient demand for commercial launch services and community support for the project. The developer would be required to prepare a Supplemental Environmental Impact Statement.

September 21, 1993

Governor John Waihee
State Capitol
Honolulu, HI 96813

SUBJECT: PROPOSED PLANS FOR A SPACE PORT IN KA'U

Dear Governor Waihee:

I am in favor of keeping the land in Ka'u in its natural pristine state. Before you vote in favor of a space port in Ka'u, please consider other past experiences with rockets and rocket fuel.

Several years ago I lived in Las Vegas when a rocket fuel plant in Henderson, Nevada caught fire and exploded. My work place was 10 miles from the explosion, yet the concussion of the two shock waves rocked our building. The building vibrated and swayed raining dirt, dust, and ceiling tiles on our heads. Many of my coworkers were convinced we had experienced an earthquake. After calling Civil Defense, we were astounded to learn the shock waves were from a manmade disaster; we could not tell the difference between the two.

Outside a cloud of black smoke of enormous proportions quickly replaced the clear blue sky. My eyes soon became itchy and watery from the various acids that had been flung into the air, and the insides of my nose and throat began to burn. I could not look up at that black cloud without feelings of doom and sadness welling up inside me. The sound of sirens from the emergency vehicles for the next 4 hours were a continuous reminder that close by people were hurt and suffering.

This was one of the most confused, upsetting, and saddest days of my life and I am so afraid that if a space port is built in Ka'u I may one day have to live through a similar catastrophe here in beautiful Hawaii nei.

I want to avoid that. I never want to experience so much tragedy in a single day ever again.

12-378

I came to Hawaii to live because it is quiet and beautiful, not to hear rockets being fired. I came here for the fresh air and clean water; and for the inner peace that only a quiet rural setting can provide. And you can bet there are thousands of people who feel as I do.

The island of Hawaii must be preserved (all of it and especially Ka'u). Climatically, the island of Hawaii is a small, natural representation of our planet. On this island we have 25 different climate zones each growing the flora and fauna associated with it. It is unique. The island of Hawaii cannot even be compared to the other islands in this chain.

Why must we risk 25 different ecological systems working in perfect balance with one another to acid rains? Why must we risk hundreds of different species of fish (dozens of which Hawaiians rely on for food) to chemical spills? Why should we put the safety of our lives in someone else's hands? Why? You surely must know that when there is an accident, no amount of economic reimbursement can replace life.

The native people of Hawaii have a great love for the aina and have always treasured and preserved the land in it's natural, pristine state. You have no right to vote to undo centuries of their nurturing and caring.

Tourists will not pay money to come here because our island will have incorporated the various sites (ugly storage tanks, eyesore pipelines, and cold impersonal steel towers), smells (smoke and fuel fumes), and noise (rumbling and hissing machinery) as they are trying to take vacations from. So while this aviation company is spouting off about the economic benefit the supposed project is supposed to bring, I do not hear any assurances that that benefit will exceed what we will loose from more benign, safer, healthier industries if we are just left to grow on our own.

The proposed site itself is unsafe. I appeal to your common sense to know that you do not put store hazardous, toxic, carcinogenic substances: 1) in an earthquake zone; 2) in a lava flow area; and 3) in a tsunami zone. The fact that the site is in all three zones compounds the foolishness of voting to build in this area.

The proposed space port is also in conflict with the State of Hawaii's goal to become the Health State as the introduction of hazardous, toxic, and carcinogenic chemicals to an area where there currently are none cannot produce good. The introduction of more smoke and fumes to our already VOG-laden air can only have negative respiratory impacts on the health of our citizens.

As my elected official I ask you not to gamble with my life. The few promised infrastructure changes make lousy stakes and make no meaningful improvement in my life. I see them as self-serving on the part of the contractor and not really for my benefit. I have lived through one rocket fuel explosion and do not want to risk a similar experience.

Please represent me by voting NO on the space port.

Thank you.

Sincerely,

Valerie Kos

Valerie Kos
Post Office Box 799
Honaunau, HI 96726

12-379

JOHN W
GOV
JEANNE K. SCH
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RICK E
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SEP. 30 1994

Ms. Valerie Kos
P.O. Box 799
Honaunau, HI 96726

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Kos:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

The analyses in the dEIS represent a conservative overestimation based on the RME method; the effect of mitigating measures were not considered in the evaluations. In addition, because the purpose of the dEIS was to identify potential hazards, accident probabilities and casualty expectations were not computed. This would be done when an actual project is assessed (not just a conceptual plan).

The dEIS addresses operational impacts by dealing with each hazardous procedure or situation under worst case conditions. The worst case includes evaluating impacts without the mitigating effects of standard operating procedures--operations plans. "Operations Plans" are management procedures and safety requirements that are established for each hazardous operation to prevent or minimize the consequences of accidents involving potential hazardous impacts.

An "Operations Plan" is a manual of written procedures that instruct employees to respond to a given situation in a prescribed manner. The operations plan also addresses the mechanical integrity of the equipment used to process, store, or handle hazardous substances. There are extensive federal compliance requirements concerning the development and approval of operating procedures (29 CFR Part 1910). A recent example of a detailed operations plan is the "step-by-step" procedures that were applied during the "in-orbit" repair of the Hubble Space Telescope.

If a specific project is developed, further hazard analyses and risk assessments would be required prior to licensing and obtaining required federal and state permits. It is emphasized that any additional hazard analyses performed for specific equipment and operating procedures will assume standard operating procedures are in place. It is likely, therefore, that such further analyses will yield less significant impacts than those presented in the dEIS.

It is the State's intent that strict environmental compliance and monitoring programs be a condition of any governmental permit issued for the project if it were to proceed. It is certain that this project would be the most closely watched and monitored of any development in the State. A comprehensive monitoring program--with strict enforcement provisions--would be in place to insure that the integrity of air, ground, water and the health of communities are not compromised. Any State initiative of this magnitude would require the consensus of the Department of Health and the Department of Land and Natural Resources, as well as a myriad of federal and county agencies. The project could not proceed if these agencies viewed it in conflict with "The Health State."

References:

Environmental Protection Agency (EPA). 1989. "Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final." EPA/540/1-89/002. December.

Thomas Langenstein
75-5753
Mamalahoa Hwy.
Holualoa, Hi. 96725

October 15, 1993

Governor John Waihee
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Aloha,

I would like to amend this letter originally dated August 30, 1993 as a result of attending an informational meeting in Kona on October 13, 1993.

This letter is in response to reading two volumes, of ten, of the Draft Environmental Impact Statement for the proposed rocket launch facility in Kau. In this document it states that county tax revenues would exceed expenditures by $ 3.7 million per year and state revenues would exceed expenditures by $ 4 million per year. While the specifics of these projections are fuzzy, it did bring to mind questions about the financial estimates used to justify this proposed project.

Do these projections include the costs of mitigation measures suggested by the DEIS or otherwise to address concerns found to be financial, ecological, or safety oriented (whether these mitigations are actually effective or not)? Such concerns and possible mitigations include building lava flow diversions, the cost of archaeological studies, real studies of effects of this project on endangered species, building a solid waste facility in the area, assembling and equipping a Safety Management and a Safety Response Team, mitigating the loss (even temporarily) of the only highway in the region, and building this project in an area frequented by crustal earthquake epicenters. I have not seen any evidence that this facility could launch a vehicle at a price comparable to facilities already in existence around the world. Other concerns I have which may or may not be able to be mitigated are:

1) Risk of hazardous spill while transporting explosive and carcinogenic fuels from Hilo to Palima Pt. pp. 5-126 - 5-135

2) The existence of wind conditions which may affect offsite populations and developments (Pahala, Punalu'u, Naalehu, Waiohinu, Kona, Volcano National Park, and Mauna Kea Observatories) - Mitigation - Provide "real time" atmospheric monitoring system and team to operate it. It is accepted that during normal tradewind conditions exhaust from a successful launch, and toxic materials resulting from an explosive launch failure, would be carried to the Kona side. The concentrations, we are assured, would be within acceptable limits and the addition of minute amounts of hydrazine, UDMH/FDH, aluminium oxide, hydrochloric acid, and other agents would not add appreciatively to the irritability of already relatively high levels of sulfur dioxide and sulfuric acid present in VOG and LAZE. For numerous reasons, Kona wind conditions would cause a postponement in a launch until weather changes. pp. 5-22 - 5-26, 5-159 - 5-161 Presently there is a burn ban through out the island to prevent a worsening of existing conditions.

3) Risk of health hazards and reduction of property values to residents as a result of pollution from successful launches, and devastation and pollution from conflagration (explosive launch failures), as well as noise and shock waves from both, in areas immediately surrounding the project site. - Mitigation - Monitor wind conditions. People living in Pahala and Punalu'u, should open and stand away from their windows during launches. Windows that break from shock waves should be replaced with sturdier ones. pp. 5-22 - 5-26 and 5-80 - 5-122

d) Access to the shoreline and surrounding waters to people who have traditionally made their livelihood, sustenance, or recreation in this area. - Mitigation - These people can go somewhere else while this facility is requiring the use of this area. pp.7-19 - 7-23 Presently the waters offshore of this proposed facility are well used by commercial fishermen for livelihood.

The development of the Pegasus launch system will make this facility obsolete before it is built. This new technology allows for satelite launches to be initiated by dropping them from the wing of a 727 at 40,000 ft. It offers launch capacity almost equal to this proposed facility. A more powerful launch vehicle, the Pegasus IV, is slated to be available by 1996. It is cheaper to operate, presents more opportunities to meet "launch windows", reduces human and wildlife risk, has the same or better advantages for polar orbit, and could use pre-existing underutilized facilities such as Hilo airport as its' base. Land transportation of fuels would be much shorter, and the infrastructure is relatively largely intact. It is also much less likely to negatively impact real property values. If the State is going to get involved in the satelite launching industry, economically this seems to make more sense when considering the impacts of the recent demise of the sugarcane industry to Hilo, safety, and infrastructure costs.

Sixty-five percent of respondents to a 1991 survey conducted for this DEIS were opposed to the proposed Kau Spaceport. It doesn't appear that the cost to benefit ratio mentioned in this study is worth it to the County and State of Hawaii when considering the infrastructure costs and loss of property values to surrounding residents (not to mention ecological cost) incurred by a project like this. This is especially true when the State of Hawaii presently does not have sufficient funds to

adequately provide infrastructure needs for the existing tax paying base in this region. For example:
1) Schools on the Big Island are so overcrowded that utilization of some temporary classrooms are the norm rather than the exception. In some cases bathrooms, cafeterias, and teachers' lounges are being used as classrooms. Cafeteria lunches, are in some cases, able to be offered to less than half of the students. Textbooks are frequently supplemented by local PTO's.
2) Recreational facilities such as parks are either non existent or inadequately maintained or developed. Presently the Kona areas' rate of drug abuse and teen pregnancy are abysmal.
3) Municipal water supply is unavailable in large areas of the Big Island.
4) Waste disposal is at crises stage island wide on the Big Island.
5) Transportation facilities (roads, traffic lights, walking and bike paths, buses, etc...) and maintainance are at dangerous conditions to support commerce, tourism, and recreation on the Big Island.
6) Kona Hospital has had for almost one year a new wing that has been sitting idle because funds to equip and make it usable have yet to be released. The rest of the hospital operates at more than 100% occupancy.

What I'm trying to say here to Gov. Waihee and our State and County officials is that if you truly wish to diversify our economy and at the same time become competitve with other tourist destinations internationally, invest our money in supporting the existing tax base that is generating these tax revinues. The only way to do that is to listen at a local level to what our wants and needs really are, and then in a timely fashion work with that community to realize them. I respectfully suggest looking into ways to support Eco-tourism on the Big Island. It may even help some of the existing infrastructure needs at the same time.

I ask you to do what you can to please put this Spaceport project to rest before it costs us any more, and get back to the basics.

Sincerely,

Thomas Langenstein

Thomas Langenstein
323-3111 - O
324-1681 - H

cc: D.B.E.D.& T. - Attn: Mr.Tak Yoshihara
State Rep. Virginia Isbell
Sen. Andrew Levin
Sen. Malama Solomon
Sen. Daniel K. Inouye
West Hawaii Today

12-382

POSTED

Thomas Langenstein
75-5755
Mamalahoa Hwy.
Holualoa, Hi. 96725

August 30, 1993

Governor John Waihee
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Aloha Governor Waihee,

This letter is in response to reading two volumes, of ten, of the Draft Environmental Impact Statement for the proposed rocket launch facility in Kau. In this document it states that county tax revenues would exceed expenditures by $ 3.7 million per year and state revenues would exceed expenditures by $ 4 million per year. While the specifics of these projections are fuzzy, it did bring to mind questions about the financial estimates used to justify this proposed project.

Do these projections include the costs of mitigation measures suggested by the DEIS to address concerns found to be financial, ecological, or safety oriented (whether these mitigations are actually effective or not)? Such concerns and possible mitigations include building lava flow diversions, the cost of archaeological studies, real studies of effects of this project on endangered species, assembling and equipping a Safety Management and a Safety Response Team, mitigating the loss (even temporarily) of the only highway in the region, and building this project in an area frequented by crustal earthquake epicenters. Other concerns I have which may or may not be able to be mitigated are:
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3) Risk of health hazards and reduction of property values

to residents as a result of pollution from successful launches, and devastation and pollution from conflagration (explosive launch failures), as well as noise and shock waves from both, in areas immediately surrounding the project site. - Mitigation - Monitor wind conditions. People living in Pahala and Punalu'u, should open and stand away from their windows during launches. Windows that break from shock waves should be replaced with sturdier ones. pp. 5-22 - 5-26 and 5-80 - 5-122
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1) Schools on the Big Island are so overcrowded that utilization of some temporary classrooms are the norm rather than the exception. In some cases bathrooms, cafeterias, and teachers' lounges are being used as classrooms. Cafeteria lunches, are in some cases, able to be offered to less than half of the students. Textbooks are frequently supplemented by local PTO's.
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I ask you to do what you can to please put this project to rest before it costs us any more, and get back to the basics.

Sincerely,

Thomas Langenstein

Thomas Langenstein
323-3111 - O
324-1681 - H

cc: D.B.E.D.& T. - Attn: Mr.Tak Yoshihara
State Rep. Virginia Isbell
Sen. Andrew Levin
Sen. Malama Solomon
Sen. Daniel K. Inouye
West Hawaii Today
KGU Rad.0

10-29-93

Thomas Langenstein
P.O.Box 1165
Catain Cook, Hi. 96704

Aloha Governor Waihee,

It was very rewarding to see Lockheed finally come out and teÍl you that this planned spaceport in Kau doesn't make any sense to them either. The residents of this island have been saying the same for years. Now that it's clear that you are not representing any interested developers and you are not representing the community where you are trying to build this project, who are you representing in continuing to support the proposed rocket launch?

My hope is that common sense will become contagious and our Federal, State and County representatives will realize that their first responsibility is to provide basic needed infrastructure to the tax paying public. Services and facilities that improve things such as schools, roads, hospital or health services, solid waste disposal, sewage management, environmental management, and recreation will do far more to improve business, tourism, and economic development than any other "innovative" ideas. While we can't retrieve the over six million dollars presently wasted on this project, it might serve to refocus our government who is killing our economy by taxing it to death and not providing essential services. If money is left over after providing these essential services, THEN let your mind wander toward the heavens to your hearts content.

As an answer to the question posed in the DEIS for the Spaceport: "If not a Spaceport then what?", as if the State doesn't know what to do with all the money, I offer as a suggestion to take advantage of the worldwide trend toward Ecotourism. This is a concept that establishes that there is value in beautiful vistas, abundant and healthy watershed and wildlife, natural settings, and development that is responsible to the community in which it is located. This is something that would fit into existing cultural values and lifestyles in Hawaii and that we would all like to live near. An example that comes to mind is spending our tax dollars to build a system of bicycle paths and hiking trails. Right now there are tourists and participants in sporting events like the Ironman Triathlon who have come here year after year only to risk their lives on our overcrowded roads, to the anger and frustration of many the residents, who are trying to be tolerant of the same.

Our County and State governments consistently maintain that events like this are good for our economy. Why has there been so little support to make it an event that all residents can look forward to? Right now many businesses are forced to close down or are being otherwise adversely affected because our roads are just inadequate to handle the load. This negates many economic benefits that events like this bring. The event sponsors are not the bad guys. Our officials who are supposed to be responsive to our communitiy's needs are the negligent ones.

The next time plans are being made to send officials to Europe, Japan, Austrailia, or elsewhere, or spending large amounts of money in an advertising campaign to get people to come here, instead consider spending that money on something that will draw them here. Money that is spent to that end will stay here and keep working for us. Happy visitors who have come here and felt that they got their moneys' worth will do the advertising for us.

Aloha,

Thomas Langenstein

Thomas Langenstein
Holualoa
324-1681

cc: Mr. Mufi Hannemen
West Hawaii Today

12-384

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGERS
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
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SEP. 30 1994

Mr. Thomas Langenstein
75-5753 Mamalahoa Hwy
Holualoa, HI 96725

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Langenstein:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-385

ACTA Inc., Decision Analysts Hawaii Inc., and Risk Science Associates contributed to the following responses.

Comment: *In this document it states that county tax revenues would exceed expenditures by $3.7 million per year and state revenues would exceed expenditures by $4 million per year. While the specifics of these projections are fuzzy, it did bring to mind questions about the financial estimates used to justify this proposed project.*

Do these projections include the costs of mitigation measures suggested by the DEIS to address concerns found to be financial, ecological, or safety oriented (whether these mitigations are actually effective or not)? Such concerns and possible mitigations include building lava flow diversions, the cost of archaeological studies, real studies of effects of this project on endangered species, assembling and equipping a Safety Management and a Safety Response Team, mitigating the loss (even temporarily) of the only highway in the region, and building this project in an area frequented by crustal earthquake epicenters.

Response: The assumptions for the fiscal-impact analysis, which addresses the issue of how the launch facility would affect state and county revenues and expenditures, is given in Table 8-1 of Appendix IXA.

Regarding the various mitigating measures mentioned in your letter, the cost of these would be borne by the launch companies that form the Consortium; it would not be paid by the state or the county. This would be spelled out specifically in the legal agreements that would be negotiated between the Hawaii Spaceport Authority and the launch companies that form the Consortium (see DEIS, Appendix XE, pp. 49 - 52). This approach is consistent with the objectives of the State Spaceport Management Plan, which calls for identifying clearly the responsibilities and obligations of the launch companies and government agencies (DEIS Appendix XE, p. 4). Since the costs would be borne by the launch companies, they would not affect the fiscal-impact analysis.

Comment: *I have not seen any evidence that this facility could launch a vehicle at a price comparable to facilities in existence around the world.*

Response: This is indeed a valid concern. The spaceport would be developed only if driven by sufficient demand for commercial services, and if the facility could support launches at a comparable price to other launch facilities. The main competitive advantage of a Hawaii launch site is that it enables both polar and equatorial launches, thus eliminating the need for duplicate launch facilities at two locations. The launch schedule in the conceptual plan assumed prices that are competitive with those at the national ranges.

Comment: *Other concerns I have which may or may not be able to be mitigated are: 1) Risk of hazardous spills while transporting propellants from Hilo; 2) The existence of wind conditions which may affect offsite populations; 3) Risk of health hazards and reduction of property values to residents as a result of pollution from successful launches and launch failures; and 4) Access to the shoreline and surrounding waters to people who have traditionally made their livelihood, sustenance, or recreation in this area.*

Response: 1) According to Dr. Greenberg of Risk Science Associates, extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment. It must be remembered that the hazardous materials response team will travel in the convoy and be partially suited-up. Their efforts will be directed immediately toward spill containment after donning respirators and gloves. Anyone who has ever worn full protective equipment or who has even witnessed a hazardous materials response demonstration knows that a self contained breathing apparatus can be donned and the protective suit sealed in a matter of minutes. In fact, the emergency response personnel consulted for this project stated that under these specific conditions of transportation, containment and covering of a one drum spill could be accomplished in ten minutes.

The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (page 3-2 of Appendix A of Volume VI prepared by ACTA and page 5-54 of Volume I). According to ACTA, *"the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."* ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than one drum or one cylinder per truck accident is considered to be unlikely.

In over thirty years of transporting rocket fuels from the Mississippi River to Vandenberg Air Force Base, ACTA is aware of only a few instances where a release to the environment occurred. ACTA is not aware of any accident where more than one container was breached. Vandenberg Air Force Base receives many rocket fuel shipments each year from the Mississippi River and considerably more in both quantity and volume than would likely be transported within Hawaii. These shipments are highly controlled as regard to the route, hazmat teams, time of day, transporting vehicle speed, etc. Experience, therefore, does not suggest that the breach of more than one container is a reasonable and realistic. ACTA is not aware of even the breach of one 55-gallon drum of hydrazine in a transportation accident in over 30 years of operation of U.S. launch facilities.

As you stated, it is possible that the mitigating measures mentioned above may not satisfy public safety concerns. If they are developed and become available, alternative non-toxic propellants could be used, or an alternative harbor near the site could be developed to remove the risks associated with transporting the propellants from Hilo.

2) It should be stated that during actual operations of the Palima spaceport the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I on page 2-14 states: *"Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket. Air quality and meteorological measurements are conducted continuously to ensure rapid detection and response to elevated levels of hazardous vapors."* This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would also be required to comply with federal and state emergency preparedness and hazardous materials handling requirements as described in Volume I page 5-136 section 3.0 entitled, *"Emergency Response Capabilities"*.

3) Air quality impacts are discussed on page 4-26 of the dEIS. The dEIS states that *"the existing air quality in the project area is affected mostly by air pollutants from natural sources, transportation sources, and agricultural activities."* The dEIS further states that, under normal operating conditions of the proposed project, minimal emissions of RP-1 (kerosene vapor), hydrazine, MMH, and nitrogen tetroxide may occur during fuel loading activities for the Atlas IIAS. Emissions due to venting of RP-1 from storage tanks during propellant loading operations are expected to be minimal due to the low vapor pressure of this substance. Emissions of hydrazine during transfer and loading into rockets is expected to be minimal due to its low vapor pressure. Emissions of trichloroethylene may occur during rocket engine flush and could result in high maximum hourly hydrocarbon emissions. Releases of hypergolic propellants during Delta II normal pre-launch operations and scheduled post-launch maintenance are not expected to result in significant adverse impacts to the environment.

Emissions of EPA Criteria Pollutants are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Thus, impacts to ambient air quality, including visual impacts to scenic vistas, from the Hawaii Spaceport are expected to be insignificant because the emissions are generated intermittently, and are of short duration.

Air quality effects from rocket launches are discussed on page 5-83 of the DEIS. Estimated annual launch exhaust emissions that would be generated from launch operations at the Hawaii Spaceport are: aluminum oxide (PM_{10})-100 tons/year, carbon monoxide-100.8 tons/year, and nitrogen oxides-8 tons/year. Thus, emissions of criteria pollutants during rocket launches are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Cumulative impacts on air quality from launch operations, including visual

impacts to scenic vistas, are not anticipated to be significant because of the intermittent nature of the vehicle launches. Mitigation measures to be taken to avoid impact on population centers by the exhaust ground cloud will limit launches to times when meteorological conditions are favorable.

Impacts of Spaceport employee vehicular trips and vehicular carbon monoxide effects were also assessed (see page 4-27 of the DEIS). Modeling results indicate that emissions generated by employee vehicles would result in an increase of 0.1 ppm by volume (114 $\mu g/m^3$) in the ambient concentration of CO. This value represents only 1% of the 1-hour HAAQS (Hawaii Air Quality Standards) which is 10,000 $\mu g/m^3$. Thus, the air quality impact of mobile sources associated with the proposed project is considered insignificant.

Outside the Population Control Zone (PCZ), a reduction in property values is not anticipated, given the low frequency of launches, the low level of pollution resulting from launches, the small probability of a major explosion during a launch, and range safety systems to contain impacts within the PCZ in case of an explosion.

4) As stated on page 7-21 of Volume II, improved access may increase the level of public use between Punalu'u and Palima Point. Currently the site permits limited vehicular access due to locked gates. Closures would temporarily disrupt coastal access and use, however, the intermittent effects of shoreline closure would be limited to between 10 and 40 days per year. Implementation of the Shoreline Access Management Plan (Appendix XE) will serve to mitigate concerns from both current and future users. Losses in revenue could be offset by compensation from the launch facility operators, as is the case at Vandenberg AFB and Cape Canaveral AFB.

Comment: *The development of the Pegasus launch system will make this facility obsolete before it is built. If the State is going to get involved in the satellite launching industry, economically this seems to make more sense when considering the impacts of the recent demise of the sugarcane industry to Hilo, safety, and infrastructure costs.*

Response: With regard to Pegasus, this is a relatively low-cost delivery system for small satellites (up to about 1,100 pounds), but is unsuitable for launching the medium-sized satellites (up to about 17,000 pounds launched from an Atlas/Centaur rocket configuration) that are envisioned for spaceport.

Also, it is extremely unlikely that Hilo Airport would be used as a base for a Pegasus launch since it would be far less expensive for a launch company to use a mainland airport near existing tracking facilities. Using a mainland airport would avoid the cost of constructing expensive tracking and control facilities in Hawaii, and the expense of flying Pegasus, the satellite, and the launch crew to Hawaii.

Comment: *It doesn't appear that the cost to benefit ratio mentioned in this study is worth it to the County and State of Hawaii when considering the infrastructure costs and loss of property values to surrounding residents (not to mention ecological cost) incurred by a project like this. This is especially true when the State of Hawaii presently does not have sufficient funds to adequately provide infrastructure needs for the existing tax paying base.*

Response: The economic benefits and impacts of a commercial rocket launching facility are discussed in Appendix IXA. From an economic perspective, the analysis indicates that the benefits to Hawaii residents would far outweigh its costs.

Given the economic outlook for Ka'u, it is difficult to be optimistic regarding the prospects for full employment. Ka'u needs jobs for existing unemployed workers, for those who will be laid off soon from the sugar operations of Ka'u Agribusiness Co., Inc., for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. Agriculture, tourism, and other economic activities in Ka'u are not expected to grow sufficiently to provide the needed jobs.

A major benefit of a commercial rocket launching facility would be increased job opportunities on the Big Island. As discussed in Appendix IXA, and Volume I pages ES-2 through ES-5, 4-1 through 4-9, and 5-1 and 5-2, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka'u.

The estimated 290 jobs for the local labor force in Ka'u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the space industry for most of these workers range from $25,000 to $45,000. Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

Even though the launch facility would provide significant employment, it would still not be sufficient to provide full employment in Ka'u.

Other economic benefits of a launch facility would include higher family incomes, and a greater selection of goods and services made possible by a larger economy.

The impact of the project on the state and county governments revenues and expenditures is also discussed Appendix IXA. As noted in the report, the launch facility would strengthen state and county finances by providing significant income. Annual revenues derived from this project at full development would be sufficient to (1) finance highway, school and other improvements; (2) provide the same level of per-unit services as are provided currently to island residents and visitors; and (3) serve additional community needs, with revenues to the county exceeding $3.7 million per year, and revenues to the state exceeding about $4 million per year, for a total *net increase* in revenues of $7.7 million per year .

Regarding property values, a reduction is not anticipated for property outside the PCZ, as previously noted. Judgments on whether the benefits of the launch facility are worth the costs and risks are up to the residents, relevant government regulatory agencies, and the Legislature. The role of the DEIS is to provide accurate and relevant information that will allow well-informed judgments.

12-388

Comment: *I respectfully suggest looking into ways to support ecotourism on the Big Island.*

Response: Your comments on ecotourism are well taken. The State is, in fact, promoting ecotourism, sporting events, and the building of hiking trails and bicycle paths.

3830 Crescent Drive
Santa Barbara, CA 93110
11/17/93

Dear Deputy Director Yoshihara,

I strongly object to the continuance and/or acceptance of the Draft Environmental Impact Statement (DEIS) regarding the possibility of a rocket launch facility at Palima Point.

The potential for disastous and irreversible damage to the natural and human environments is unacceptably high.

I urge you to support and initiate an immediate withdrawal from the DEIS process.

yours truly,

Tammie Lee

Tammie Lee

12-389

JOHN W.
GOV.
JEANNE K. SC
DIR
RICK E
DEPUTY DIR
TAKESHI YOSH
DEPUTY DIR

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SEP. 30 1994

Ms. Tammie Lee
3830 Crescent Drive
Santa Barbara, CA 93110

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Lee:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *I strongly object to the continuance and/or acceptance of the dEIS regarding the possibility of a rocket launch facility at Palima Point.*

Response: The dEIS is based upon public concerns that were raised during the scoping process. The dEIS addressed those concerns in the context of a conceptual plan. Agencies and the public used the review period following the release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address the public and agency comments raised during the public review period. The State funded the EIS to disclose the potential impacts of building a spaceport, recognizing that some unresolved issues may require supplemental studies by a developer.

There is no specific project under consideration at this time. If an actual launch project for Palima Point is proposed at some time in the future, supplemental studies relating to the specific project under consideration would be paid for by the developer.

12-390

Comment: *The potential for disastrous and irreversible damage to the natural and human environments is unacceptably high.*

Response: Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The Health Risk Assessment conducted for this project (DEIS Volume VIII, Appendix A) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

SEND COPIES TO
APPROPRIATE PARTIES

POSTED NOV 15 1993

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

'93 NO 16 P2

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Cynthia G. Lewis

Date: November 13, 1993

Name and address:
Cynthia G. Lewis
607 Iwalani ST
Hilo Hi 96720

Cc: - Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

- State of Hawaii, OEQC
220 South King St., 4th fl.
Honolulu, HI 96813

c: Kenneth Munechika, DBEDT

12-391

JOHN WA
GOV
JEANNE K. SCH
DIR
RICK EC
DEPUTY DIRE
TAKESHI YOSHIH
DEPUTY DIRE

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Cynthia Lewis
607 Iwalani St.
Hilo, HI 96720

Dear Ms. Lewis:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-392

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Chris Malabe

Date: 12/1/93

Name and address:

Chris Malabe
786629 Alii Drive
Kailua Kona Hi 96740

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-393

Dear Fellow Earthlings,
Unless we stop the destruction of our precious resources, such as the space port, exploiting peoples around the world & its animals, we are doomed as a species. I can not see any reason to build this space port here or anywhere. How about this for a novel idea. Why dont we concentrate on the problems we have here – like deforestation, world hunger, AIDS, rampant pollution & over population. We as a collective consciousness can reverse the ever present danger of annihilating ourselfs just like the plants animals & insects that are going extinct at a rate of one a day – life that will never come back. Please reconsider this evil space port and the greedy developers that would profit & live there sheltered providing lifestyles at the expense of the rest of the world! Including your selfs because we are all one organism. Please think about the future of your children & their children, children.

Very sincerely
Chris Malabe

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
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SEP. 30 1994

Chris Marble
786629 Alii Drive
Kailua-Kona, HI 96740

Dear Mr. Marble:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

12-394

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I)

SEP. 30 1994

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor Jonn Waihee to continue with this project.

Yours sincerely,

Signature: Mara Marin

Date: 11/21/93

Name and address:
149 Pauhai Dr
Hilo, Hi 96720

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-395

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Mara Marin
169 Pauhai Dr.
Hilo, HI 96720

Dear Ms. Marin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-396

11/10

I'm sorry I cannot write my own letter to express my concern about this issue. Too busy earning taxes to pay for this nonsense! (I have my own business). Please look into your heart and say: STOP.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Gerdine Martin

Date: 11/10/93

Name and address:

211 Nohea St.
Hilo, HI 96720

Cc: -Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

-State of Hawaii, Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

12-397

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGE
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

Ms. Gerdine Martin
211 Nohea St.
Hilo, HI 96720

Dear Ms. Martin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-399

November 17, 1993

Department of Business, Economic Development & Tourism
Attn:Mr. Takeshi Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, HI 96804

Dear Deputy Director,

After reviewing the State Draft Environmental Impact Statement(EIS) for a commercial satellite launching facility I have the following considerations which I would like addressed more completely:

In the event of a misfire, what would the ramification be to the human population and the animal, plant, and aquatic environments both locally and around the Island?

Since earth quakes are so prevalent and the proposed sites are in such a geologically hazardous areas, what are the potential impacts?

Regarding the threat of a tsunami, what might one expect from a disaster of this sort?

Finally, after reading the report, we do not believe there will be any economic advantage to the area nor to the State. Also due to the likely nature of catastrophic environmental impact, this proposal seems inappropriate and all funding towards this effort should be halted immediately. Perhaps the State's help in developing water resources for diversified sustainable agriculture might be more useful and profitable for the future of the Hawaiian Islands.

Thank you,

Scott & Margaret Martin

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

Mr. and Mrs. Scott and Margaret Martin
P.O. Box 721
Naalehu, HI 96772

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. and Mrs. Martin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Decision Analysts Hawaii, Inc. contributed to the following responses.

Comment: *In the event of a misfire, what would the ramification be to the human population and the animal, plant, and aquatic environments both locally and around the Island?*

Response: Impacts resulting from launch failures are discussed in Chapter 5 of Volume I. They are also covered in-depth in Volumes VII and VIII. The effects are summarized in the beginning of Volume I in the Summary section.

Comment: *Since earth quakes are so prevalent and the proposed sites are in such a geologically hazardous areas, what are the potential impacts?*

Response: The potential impacts resulting from geologic activity at Palima Point are discussed in Chapters 4 and 5 of Volume I, and in Appendix IIIA.

12-400

Comment: *Regarding the threat of tsunami, what might one expect from a disaster of this sort?*

Response: Figure III-2.5 on page 3-31 of Volume I depicts the estimated tsunami inundation zone. As noted, only a small portion of the pad 3 area is within the tsunami inundation zone. The launch pad structure itself would not occupy the entire launch pad area as shown on the map, however, the perimeter may include a road or a gatehouse. The Conceptual Project Description (DBEDT, 1993) and the dEIS recommend that the launch structures be located in areas of at least 60 feet elevation, outside of the tsunami inundation zone. While it is possible that a launch pad located outside of the inundation zone could sustain damage from an unusually large tsunami, the damage is expected to be minimal because most launch pads are concrete structures built to withstand the pressures of a rocket launch or an explosion on the pad.

A rocket launch pad is typically elevated somewhat above grade on a large, usually reinforced concrete, foundation. Typical tsunami damage occurs by the strong hydrodynamic forces during the inundation and draw-down of the water which erodes the foundations of buildings and may cause additional damage by impact of objects, such as trees, boulders, vehicles, parts of structures, torn loose and thrust against erect buildings. The large foundation of the launch pad could be designed to rise above the maximum credible tsunami run-up level, and be strongly anchored to bedrock (basalt lava flows) to avoid erosion at its base. More vulnerable parts of the launch pad would then be elevated above the potential

tsunami run-up and the massive foundation would resist the hydrodynamic forces of the inundation. Corrosion effects of the salt water inundation would be resisted by the regular maintenance procedures of a facility erected along the seacoast where salt spray is an ever-present corrosive agent.

Comment: *We do not believe there will be any economic advantage to the area nor the State. Also, due to the likely nature of catastrophic environmental impact, this proposal seems inappropriate and all funding towards this effort should be halted immediately. Perhaps the State's help in developing water resources for diversified agriculture might be more useful and profitable for the future of the Hawaiian Islands.*

Response: The economic benefits and impacts of a commercial rocket launching facility are discussed in Appendix IXA. From an economic perspective, the analysis indicates that the benefits to Hawaii residents would far outweigh its costs.

Given the economic outlook for Ka'u, it is difficult to be optimistic regarding the prospects for full employment. Ka'u needs jobs for existing unemployed workers, for those who will be laid off soon from the sugar operations of Ka'u Agribusiness Co., Inc., for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. Agriculture, tourism, and other economic activities in Ka'u are not expected to grow sufficiently to provide the needed jobs.

A major benefit of a commercial rocket launching facility would be increased job opportunities on the Big Island. As discussed in Appendix IXA, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka'u.

The estimated 290 jobs for the local labor force in Ka'u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the space industry for most of these workers range from $25,000 to $45,000. Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

Even though the launch facility would provide significant employment, it would still not be sufficient to provide full employment in Ka'u.

Other economic benefits of a launch facility would include higher family incomes, and a greater selection of goods and services made possible by a larger economy.

The impact of the project on the state and county governments revenues and expenditures is also discussed in the aforementioned Appendix. As noted in the report, the launch facility would strengthen state and county finances by providing significant income. Annual revenues derived from this project at full development would be sufficient to (1) finance highway, school and other improvements; (2) provide the same level of per-unit services as are provided currently to island residents and visitors; and (3) serve additional community needs, with revenues to the county exceeding $3.7 million per year, and revenues to the state exceeding about $4 million per year, for a total *net increase* in revenues of $7.7 million per year .

Judgments on whether the benefits of the launch facility are worth the costs and risks are up to the residents, relevant government regulatory agencies, and the Legislature. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The State has explored and is continuing to explore the economic feasibility of producing ethanol from sugarcane. Unfortunately, this is unprofitable using current technology. Also, the State has been, and continues to be, very supportive of diversified agriculture, including dairies. Unfortunately for Ka'u, it is more profitable for farmers to grow most (but not all) crops in other areas in the State that have better agronomic conditions than those which exist in Ka'u, and where the crops are closer to major markets and/or to overseas shipping terminals. It is possible to have both a launch facility and diversified agriculture in Ka'u. However, even with both, employment growth is not expected to be sufficient to provide full employment.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: J Moore

Date: 11/22/93

Name and address:

110 Kaiakaua ST
Hilo Hi 96720

Cc:_ Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

-State of Hawaii, Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

12-402

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu, Hawaii 96813
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

J. Moore
110 Kaiakaua St.
Hilo, HI 96720

Dear J. Moore:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

SEP. 30 1994

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-403

PLEASE COORDINATE WITH

FOR:

___ Comment/Recommendation (memorandum)
___ Appropriate attention
✓ Direct reply (cc: Governor)
___ Your information/file
___ Draft reply for Governor's signature
___ Follow up/report
___ Submit copy of response (if any)
___ Keep enclosure(s)
___ Return enclosure(s)
___ Other

JA

DUE seven working days from OCT 2 1 1993
(If delay is encountered in meeting suspense date, please advise by telephone immediately)
In reply, please refer to: 93-526-07

RECEIVED
OCT 2 1 1993

Jon Myers
76-338 Wana St.
Kailua-Kona, HI 96740

John Waihee
State Capitol
Honolulu, HI 96813

Dear Governor,

I have an acre in Hawaii Ocean View Estates, and plan on moving on to it in the near future. I'm not moving there for the work. I love the country there, and I moved from Oahu to the Big Island for this reason, To get away from the hussle and bussle and crowds and type of people that are on Oahu.

In 2 years I should have my own Plumbing Bussiness going and with it, I'll be ok in Kau. There are alot of us. I hear we're the majority people who live in Kau and don't need the space port for job security - are not going to let you put it there!

Please stop spending my taxes on any further space port ventures, research etc.. We need the money for our schools more than most anything else.

Ref. # 93-305-W
From: Director's Office
To: OSI
Coordinate with:
ZC: TY TS MH

✓ Draft reply for Governor's signature
___ Draft reply for Director's signature
___ Direct reply (cc/box 2)
___ Comment/Recommend
___ Follow up/Report
___ Your information/file
___ Keep enclosure(s)
___ Return enclosure(s)
___ Other

Due date Oct. 27, 1994

I'm embarrassed to death when my main land friends compare their childrens schools in the mainland to ours. I saw one of my friends childs history books and was shocked to see how old the book was. It was so old fashioned. Their classes are so crowded, Teachers are under paid, they need money

Stop with the spaceport spending. Put money into our schools, we're not going to let you get your space port any way!

Instead of just a lame campaign gimmick, why not become the education governor?

Jon Myers

JOHN WAIHEE
Governor
MUFI HANNEMANN
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

October 25, 1993

Mr. Jon Myers
76-338 Wana St.
Kailua-Kona, HI 96740

Dear Mr. Myers:

I am replying to your letter which was received by Governor Waihee on October 21, 1993.

Jon, it is certainly true that the State of Hawaii has expended funds to investigate the feasibility of the proposed spaceport. We have done so in the hope that it could benefit the people of the Big Island and the state. While you seem to feel that you will be doing well enough in your own plumbing business there are unfortunately many others on Big Island that may be unemployed because of the downturn of sugar. It is important to expand our economic base, particularly at this time when the Big Island is experiencing severe economic difficulties.

If the launch facility is developed, then the State will assist the developer by improving roads, utilities, schools and hospitals in the area. This will clearly benefit everyone in Ka'u, not just those people working at the spaceport.

I hope that this helps you to understand that DBEDT is working to improve conditions for all of our state's residents by expanding and diversifying our economy. The proposed launch facility offers the promise of jobs for hundreds of our people in an area currently experiencing an uncertain economic future. It is just one of many projects we are pursuing in hopes of bringing more quality jobs to the state.

Sincerely,

Mufi Hannemann

12-405

11/2/93

Mr. Hannemann,

I didn't know that the requirement for a developer of the spaceport would be to chip in for improvements of roads, schools & hospitals. That's an expensive requirement! Please let me know more about this if you have the time.

Yes. I feel fortunate enough to have a small means of income to support my family and I know about the loss of jobs because of the lagging sugar industry. The same is happening right now in my home town on Oahu, Waialua, but is a spaceport the best way to create jobs Mufi?

In Kau, like Waialua, the residents are trying to find a viable means of economic growth, but no one wants to change the country atmosphere that we all love so dearly. A spaceport would do just that.

Have we looked into converting cane into gas? That would create more jobs. How about diversified agriculture? How about expanding the dairy business? I'll think more about it and let you know. Sincerely, Jon Myers

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Centre Pacific Plaza 220 South King Street 11th Floor Honolulu, Hawaii 96813
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

Mr. Jon Myers
76-338 Wana St.
Kailua-Kona, HI 96740

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Myers:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-406

KRP Information Services and Decision Analysts Hawaii, Inc. contributed to the following responses.

Comment: *Spaceport jobs are not needed in Ka`u. The rural life-styles should be preserved.*

Response: You mentioned in your letter that you are moving to Ka`u and that you plan to start a plumbing business. If successful, you will be fortunate to have the technical and business skills required to run your own business, and to operate in a community which can absorb an additional plumbing company.

Overall, it is difficult to be optimistic regarding employment prospects for many residents of Ka`u, even if the launch facility is built (this is discussed in Volume IX, Appendix A, Chapters 3 through 6 of the dEIS). Ka`u needs jobs for existing unemployed workers, for those who will be laid off soon from the sugar operations of Ka`u Agribusiness Co., Inc., for the young people who will be graduating from high school in the coming years and for new residents who are attracted to the District due to comparatively low land and housing costs.

It is possible that new resorts will provide jobs; however, after many attempts over the years, significant resort development has yet to be realized in Ka`u. In addition, while diversified agriculture is expected to expand in Ka`u, it will not be sufficient to provide full employment.

A launch facility would provide about 290 additional jobs for Ka`u residents. These jobs would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, plumbers, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages for most of these workers range from $25,000 to $45,000. Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, and similar occupations.

Judgments on whether the benefits of the launch facility are worth the costs and risks are up to the residents, relevant government regulatory agencies, and the Legislature. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

Comment: *We need more funding for education instead of a spaceport.*

Response: Both education and economic development are important. Private funding for development and operation of the proposed spaceport would generate taxes to add to available funds for education.

Comment: *The State should explore alternative ways to create jobs such as dairy, agriculture.*

Response: The State has explored and is continuing to explore the economic feasibility of producing ethanol from sugarcane. Unfortunately, this is unprofitable using current technology. In addition, the State has been, and continues to be, very supportive of diversified agriculture, including dairies. Unfortunately for Ka`u, it is more profitable for farmers to grow most (but not all) crops in other areas in the State that have better agronomic conditions than those which exist in Ka`u, and where the crops are closer to major markets and/or to overseas shipping terminals.

Regarding dairy operations in Ka`u, S&S Dairy plans to expand its operation. After the expansion, they expect to employ a total of about a dozen people, most of whom already work for the dairy (see DEIS Volume IX, Appendix A, Chapter 5).

It is possible to have both a launch facility and diversified agriculture in Ka`u. Even with both, however, employment growth is not expected to be sufficient to provide full employment (see DEIS Volume IX, Appendix A, Chapter 6).

Comment: *Please let me know more about what the developer will pay towards the infrastructure.*

Response: This information was provided in the dEIS, Volume IX, Appendix A, Chapter 8. In brief, the developer (i.e., the private launch companies that would develop the launch facility) would provide interior roads, a water system, drainage, a sewer and wastewater disposal system, a fire station, a security building, and a medical building, a helipad and hangar. Historically, community-benefit packages have also been negotiated as a condition of State and County land use approvals.

In support of spaceport, the State would fund road and bridge improvements, power system improvements, schools, and various other improvements which may be required to support new residents and visitors. Similarly, the County would make various improvements which may be required to support new residents and visitors. Additional tax revenues paid by the companies which comprise spaceport, companies which supply goods and services to spaceport, employees of these companies, new residents, visiting workers, etc. would fund these government improvements. At full development of spaceport, the net financial gain to the State and County is estimated to be $7.7 million per year. These leftover revenues can be used to fund additional improvements and services to benefit the community, including education. Allocation of these resources is the responsibility of the State and the County governments.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Carole L Nervig Date: 11/8/93

Name and address:
Carole L. Nervig
HCR 2-13043
Keaau, HI 96749

Cc: - Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

- State of Hawaii, OEQC
220 South King St., 4th fl.
Honolulu, HI 96813

12-408

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Carole Nervig
HCR 2-13043
Keaau, HI 96749

Dear Ms. Nervig:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

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Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

KKM
RF

October 26, 1993

Governor John Waihee

I am writing in regards to the proposed spaceport in Kau. My opinion is that it is a good thing to have, but not in Hawaii.

The space port will ruin the environment around Kau and also the rest of the island. With the space port it will interfere with the viewing of the observatories on the top of Mauna Kea. It will not only hurt Kilauea, one of the largest tourist attractions, but will also harm some great fishing sites.

These are some of the reasons why the space port should not be built in Hawaii.

Sincerely
Nathan Nishiki

Nathan Nishiki
72-3990 Hawaii Belt Rd.
Kailua-Kona Hi 96740

12-410

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGE
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Mr. Nathan Nishiki
72-3990 Hawaii Belt Road
Kailua-Kona, HI 96740

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Nishiki:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Dr. Richard Brock, Engineering-Science, Inc., and Risk Science Associates contributed to the following responses.

Comment: *The spaceport will ruin the environment around Ka'u and also the rest of the island.*

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, *"Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures."* The health risk assessment uses algorithms described in EPA methodology that are *"conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."*

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

The Ecological Risk Assessment concludes that the actual risks to ecosystems from all activities associated with the facility is quite low. This should not be surprising when one considers that rocket launches have been taking place on Kauai and on the mainland (and at one time, South Point on Hawaii) for over 30 years.

If launches were polluting the environment, the problem should have manifested itself at other launch facilities such as the Cape Canaveral and Vandenberg AFB facilities. One of the best "de-facto" wildlife preserves is right adjacent to the Cape Canaveral launch facility. This preserve is maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. This preserve (the Merritt Island Wildlife Refuge) is an estuarine system with relatively low water circulation -- just the opposite of Palima Point in terms of water movement. Additionally at Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

Comment: *The spaceport will intefere with the viewing of the observatories on the top of Mauna Kea.*

Response: An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis showed easterly winds (winds from the east) during an east launch to be the direction of primary concern. Data from the higher altitudes (approximately 18 km and above) showed a significant percentage of the wind directions from the east. A copy of the report is attached.

It should be emphasized that the State of Hawaii will *not* allow the viewing integrity of the Mauna Kea observatories to be compromised by a launch facility. It is fully understood that obscuration by plumes is a potentially serious problem for which the currently proposed mitigation is believed to be adequate. In the event that the project moves forward, and refined analysis is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH Institute for Astronomy (IfA) for approval.

Comment: *The spaceport will not only hurt Kilauea, one of the largest tourist attractions, but will also harm some great fishing sites.*

Response: Kilauea is not expected to be adversely affected by the spaceport. Please refer to Volume II, Chapter 7 for a discussion of impacts to Hawaii Volcanoes National Park. The impact of the launch facility on tourism is addressed in Appendix IXA, Chapter 5, p. 5-5. As discussed in this chapter, the facility would cause a small increase in tourism due to the addition of visiting workers and their families. Also, a number of visitors might be attracted to Ka'u to witness the occasional rocket launches.

The potential impacts to nearshore marine species are covered in Appendix IIIE, pages 47 through 53. The preliminary analysis of impacts to nearshore (adult) marine communites suggests that impacts with launch facility construction and operation will be minimal, due in part, to the rapid dilution and flushing that occurs in these nearshore waters.

The high wave energy that impinges on the project coast and the steep bottom topography do not favor the development of coral reefs. Coral communities are not well developed in the areas examined by DBEDT's consultants; the fish communities present down to depths of about 100 feet are reasonably well-developed, and are typical of those found in

high energy areas. The degree of fish community development is probably related to the relative lack of fishing pressure that is exerted along this coast which is, in turn, probably related to the high energy conditions along the coast making fishing and underwater activities (SCUBA, spear fishing, netting, etc.) a dangerous and risky proposition. Coral community development is impeded by the impact of waves and scouring as well as by the steep bottom topography. Hermatypic corals are best developed at depths less than about 200 feet.

The high energy conditions suggest that any pollutant reaching the ocean would probably be very rapidly diluted and avected out of the nearshore (read coral reef community) area. This conclusion was reached by DBEDT's consultant, Dr. Richard Brock, who has studied for more than 10 years the fate of potential pollutants emanating from development along the Kona coast where the bottom topography is similar (but usually less steep) and the currents and water motion characteristics are very much less than observed around Palima Point.

It should also be realized that the organic contaminants that are released by the launch vehicles are not bioaccumulated and that aluminum released into the environment is not a foreign substance in Hawaii; significant aluminum exists in Hawaiian soils (especially on Kauai in the form of bauxite).

Finally, we recognize that if the project were to proceed, a comprehensive monitoring program should be in place to insure that the integrity of air, ground and nearshore marine waters and communities are not compromised.

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

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santa barbara ca 93101
(805) 966-6208

po box 1119
mountain view hi 96771
(808) 968-6940

Aloha Deputy Director Yoshihara,

I strongly object to the continuance and/or acceptance of the Draft Environmental Impact Statement (DEIS) regarding the possibility of a rocket launch facility at Palima Point.

The potential for disastous and irreversible damage to the natural and human environments is unacceptably high.

I urge you to support and initiate an immediate withdrawal from the DEIS process.

yours truly,

George Pace

12-413

JOHN WAIHE
GOVERNOR
JEANNE K. SCHULT
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Mr. George Pace
P.O. Box 1119
Mountain View, HI 96771

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Pace:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point by point responses to your comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Comment: *I strongly object to the continuance and or acceptance of the dEIS regarding the possibility of a rocket launch facility at Palima Point.*

Response: The dEIS is based upon public concerns that were raised during the scoping process. The dEIS addressed those concerns in the context of a conceptual plan. Agencies and the public used the review period following the release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS

The State intends to address the public and agency comments raised during the public review period. The State funded the EIS to disclose the potential impacts of building a spaceport, recognizing that some unresolved issues may require supplemental studies by a developer.

There is no specific project under consideration at this time. If an actual launch project for Palima Point is proposed at some time in the future, supplemental studies relating to the specific project under consideration would be paid for by the developer

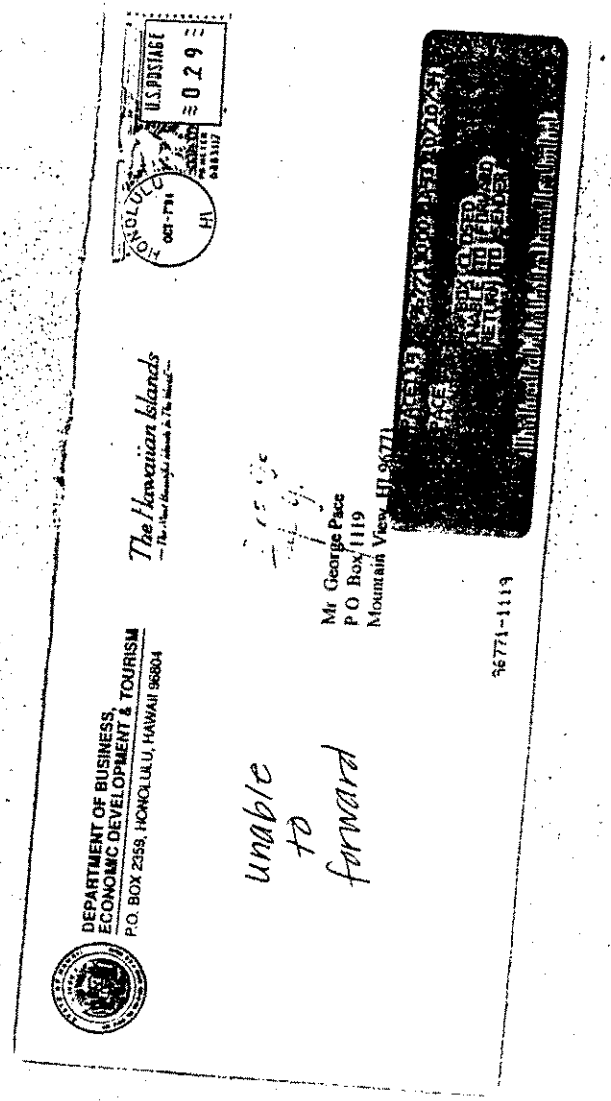
Comment: *The potential for disastrous and irreversible damage to the natural and human environments is unacceptably high.*

Response: Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

The Health Risk Assessment conducted for this project (DEIS Volume VIII, Appendix A) concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following.

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*



18 Nov 1993

Julie Stoner Pasquale
PO Box 831
Pahala, HI 96777

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, HI 96813

Dear Governor Waihee,

As a 9-year permanent resident of Ka'u, I strongly request that the Draft EIS for the Palima Point Satellite Launching Facility not be accepted by the state due to important shortcomings in the document. All relevent issues to this project have not been sufficiently addressed in the DEIS and the expected cost of completing the study is prohibitive considering the current economic situation in our state.

Some issues which remain to be addressed include:

What effect does hydrazine and other potential propellents have on the food chain, people, animals, and plants in the case of an explosion in the fuel storage area due to lava, earthquake, and/or flooding from the gulches?

On-site wind readings and gas readings should be done to determine the true course of any air-borne pollutants in relation to Pahala and surrounding areas. Storing large quantities of fuel in such a geologically unstable area increases the chances of an accident, thus we are all concerned as to the ability of the community to evacuate in time. Also, without on-site tests, no one really knows how likely it is that rockets could easily launch here as it is often quite windy. Freak gusts of considerable strength are common and could lead to a launch accident, as well. Also, what effect would the present volcanic gases have on the ability to maintain the facility safely in regards to corrosion of equipment and instruments? What sorts of chemical interaction occur between the launch plume and any vog or laze in the environment? The lack of on-site wind and gas readings in the DEIS is a glaring and irresponsible omission.

This type of industry is just too risky to proceed without having ALL necessary information. Hawaii Volcanoes Park (International Biosphere Reserve) is too great an asset to risk damaging with incompatible land use on its borders. What effect would any potential accidents have on the Biosphere Reserve? Also, the numerous archeological sites within and outside the Park boundaries are related and should be protected for their cultural significance.

The true probability of a launch accident has been severely underrated in the DEIS, particularly when it is taken into account that this facility would be built in a Lava Zone 1, in an area known for its strong earthquakes and massive cracks in the ground. The health studies in the DEIS would need to be repeated using a more realistic launch accident probability of at least one in 15 years based on the accident rate at existing facilities. What would be the expected health effects in this case?

The DEIS neglects to list the Pahala Senior Citizens Center and the Pahala Elderly Housing on its Sensitive Receptor List. What would be the procedure in which they and others would be warned of an accident and evacuated in time to prevent illness and loss of life?

I also have a question regarding Volume X, Appendix E, pg. 29 of the DEIS. The last paragraph under "Insurance and Liability" states that "The State will be self-insured for lawsuits that are unrelated to launches or activities of Spaceport but still affect Spaceport(e.g. fires or other natural disasters outside the PCZ boundary that cause delays with Spaceport; delays in construction of the infrastructure, etc.). Are the taxpayer's to pay the developer in case the Spaceport construction is delayed, perhaps permanently, by a lava flow or mountain flood originating outside the PCZ boundary? It certainly sounds that way. Can we afford underwriting this venture in this way?

Please, I implore you to cease pursuing this project for Ka'u. It has already taken too much money and time away from more worthwhile pursuits. Future expenditures toward the economic development of Ka'u would be better spent on community-based models such as is currently being pursued by Naalehu MainStreet and the Ka'u Community Development Corporation. The people of Ka'u want to be able to work with our State government, rather than continuing in an adversarial role over this issue. The Spaceport proposal was given due consideration, but has just not proven to be a viable option.

Respectfully,

J S Pasquale

Julie Stoner Pasquale

cc: Office of Space Industry, DBEDT

12-415

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Julie Stoner Pasquale
P.O. Box 831
Pahala, HI 96777

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Stoner Pasquale:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc., Cultural Surveys Hawaii, Decision Analysts Hawaii, Inc., and Risk Science Associates contributed to the following responses.

Comment: *I strongly request that the dEIS for the launch facility not be accepted by the state due to important shortcomings in the document. All relevant issues to this project have not been addressed sufficiently and the expected cost of completing the study is prohibitive considering the current economic situation in our state.*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The Department intends to address the public and agency comments raised during this public review period. The State funded the EIS to disclose the impacts of building a spaceport. We believe the EIS serves this purpose, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

Comment: *What effect does hydrazine and other potential propellants have on the food chain, people, animals, and plants in the case of an explosion in the fuel storage area due to lava, earthquake, and/or flooding of the gulches?*

Response: Any hazardous material stored on the facility must be protected in such a way that fire will not lead to burning or explosion of propellants and the introduction of toxic materials into the environment. Mitigations of this hazard include: (1) clearing of all brush some distance away from any storage area; (2) making storage areas resistant to any local fires started by propellant impacts; and (3) inclusion of adequate fire suppression equipment and procedures.

In the event of such an explosion, the food chain will not be adversely affected because none of the substances potentially spilled are bioaccumulative (in other words, substances such as aluminum oxide, hydrogen chloride, and hydrazine do not accumulate in plants or in animal tissues such as meat or milk).

The rocket propellants will not accumulate in soil either. The soil half-life of hydrazine is listed as ranging from 1-7 days while the soil half-life of UDMH is listed as ranging from 8-22 days (Howard 1991). Hydrazine in soils containing a high percentage of organic carbon is degraded while in soils containing a high clay content, it is adsorbed (HSDB 1992), indicating that hydrazine deposited to the soil will degrade rapidly. Moreover, reacted hypergolic propellants (such as hydrazine, UDMH, and N_2O_4) do not pose a toxic hazard.

The question of impact to off-site populations is not as relevant as the potential for impact to on-site personnel. From a toxic gas point-of-view, any explosion and ensuing fire will tend to reduce the quantity of material dispersed to the atmosphere and so reduce the quantity of materials deposited at off-site locations. It is likely that given the quantities of materials maintained on-site at any one time, the potential for toxic exposure to off-site populations from any conceivable scenario of this nature will be of less consequence than those discussed in the transportation study.

Given the distances from the site boundary, and the likely on-site location of fuels, the blast hazard caused by ignition of on-site fuels will be of lesser consequence than that discussed for blast scenarios elsewhere in the dEIS.

12-417

Comment: *On-site wind readings and gas readings should be done to determine the true course of any air-borne pollutants in relation to Pahala and surrounding areas. Storing large quantities of fuel in such a geologically unstable area increases the chances of an accident, thus we are all concerned as to the ability of the community to evacuate in time. Also, without on-site tests, no one really knows how likely it is that rockets could easily launch here as it is often quite windy. Freak gusts of considerable strength are common and could lead to a launch accident, as well.*

Response: You are correct in your observation that site specific meteorological data was limited and that the certain aspects of spaceport hazards analyses cannot be fully addressed unless, and until, an on-site meteorological data collection program is implemented. Wind gusts are a case in point; the mobile service tower at a launch pad supports the launch vehicle during assembly and is rolled back shortly before the scheduled launch time. This operation is typically constrained by maximum allowable winds and wind gusts, consequently a meteorological tower is located at each launch pad and the wind conditions are carefully monitored and forecasted prior to commencing tower roll back. The lack of on-site wind gust statistics has more bearing on the probability of causing launch delays than it does on inability to define worst-case wind and meteorological conditions needed to evaluate toxic hazards for the EIS.

The dEIS acknowledges that site specific meteorological data was limited and that the certain aspects of spaceport hazards analyses cannot be fully addressed unless, and until, an on-site meteorological data collection program is implemented. DBEDT's consultant, ACTA, has experience with operating the toxic dispersion models for literally thousands of meteorological balloon soundings for Cape Canaveral Air Station, Vandenberg AFB, and Edwards AFB. This experience has given ACTA insight into the meteorological patterns which typically result in the most unfavorable toxic dispersion conditions.

The seven atmospheric soundings used as a basis to analyze the dispersion of rocket exhaust plumes and abort clouds were intended to cover the range of the most prevalent weather patterns expected to occur in the Palima area. When examining the feasibility of a spaceport operation and its potential impacts on the environment and local population, it is reasonable and prudent to examine the range of meteorological conditions which apply to the area. The existence and documentation of "best case" scenarios indicates that there are certain weather patterns which are favorable to safe launch conditions and this information is of value to potential customers of an economically viable space launch operation. Likewise, every effort was made to understand the unfavorable aspects of the Palima meteorology in order to define a "reasonable worst-case scenario" for assessing the health risks associated with potential launch aborts and accidental spills. Determination of these conditions involved coordination between ACTA analysts and Dr. Thomas Schroeder, a meteorologist at the University of Hawaii, as well as review of other publications pertaining to meteorological studies of the island of Hawaii.

As a result of these considerations, a hypothetical worst-case meteorological data set was defined for use in the toxic dispersion analyses. Volume VI, Appendix D pages 2-1 through 2-4 and pages 4-1 through 4-11, present a description of the important meteorological features which affect the rise, stabilization, and dispersion of exhaust plumes. The "worst-case Kona" weather condition was defined with the following features:

- Base of the persistent tradewind inversion was lowered to 5000 feet from 6360 to represent a lower "trapping lid" beneath which the rocket exhaust gases are trapped and disperse back to the ground level.

- Winds at all elevations were oriented in the same direction thereby eliminating the enhanced gas dispersion attributable to wind shear.

Both of these modifications result in conditions which limit the dispersion rate of the rocket exhaust and result in increased ground level concentration predictions. A further "worst case" condition was added to the toxic hazard analysis by assuming that the wind direction on any given day could direct the exhaust cloud directly toward any of the 66 sensitive receptor points identified by the State of Hawaii. The maximum concentration exposure levels for these worst case weather and plume travel scenarios were documented and tabulated in

Appendix VID for each possible vehicle abort mode and each chemical species of concern and applied to the candidate launch vehicle containing the largest quantities of both liquid and solid propellants (Delta II 7925). The human health risk assessment (Appendix VIIIA) and ecological risk assessment (Appendix VIIIB) conducted by Risk Science Associates also included evaluation of hazard indices based on exposure levels derived from these worst case scenarios.

The meteorological conditions applied to predict toxic gas dispersion from accidental spills of liquid propellants which evaporate from pools without combustion were also modeled over a range of wind speeds, atmospheric stabilities, wetted pool areas and inversion heights in order to identify the conditions which result in the largest toxic hazard corridors. Once again the assumption was made that the surface winds transporting the hazardous gas could travel in any direction and concentrations at the 66 sensitive receptor sites were calculated assuming the plume travel from the spill site directly toward the receptor. The conservative nature of these modeling assumptions and the expectation that these scenarios would have a high probability of not underestimating the toxic hazard are addressed in more detail in Appendix VID, pages 5-1 to 5-3. The maximum spill quantities for the hypergolic liquids were based on 728 gallons of nitrogen tetroxide and 615 gallons of Aerozine-50 which represent the total Stage 2 tankage of a fully fueled Delta II launch vehicle. These spill quantities combined with the worst case weather conditions are deemed to represent worst case scenarios and they far exceed the accidental releases of liquid propellants which have been experienced in thousands of propellant transfers at the mainland launch facilities.

In summary, it should be stated that during actual operations of the Palima spaceport the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I on page 2-14 states: "Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket. Air quality and meteorological measurements are conducted continuously to ensure rapid detection and response to elevated levels of hazardous vapors." This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would also be required to comply with federal and state emergency preparedness and hazardous materials handling requirements as described in Volume I page 5-136 section 3.0 entitled, "Emergency Response Capabilities."

Comment: *This type of industry is just too risky to proceed without having all the necessary information. Hawaii Volcanoes National Park (International Biosphere Reserve) is too great an asset to risk damaging with incompatible land use on its borders. What effect would any potential accidents have on the Biosphere Reserve? Also, the numerous archeological sites*

within and outside the Park boundaries are related and should be protected for their cultural significance.

Response: "Unresolved Issues" is a content requirement of the State EIS Rules. In an initiative of this scope, the process of analysis and review should be as deliberate as possible. As a programmatic document, the dEIS analysis identified several areas that need further study before an informed "go/no-go" decision can be made. It was a policy decision of the State to defer further studies until an actual project is imminent so that these studies could be funded by the prospective developer and not the State. The unresolved issues will be addressed in future environmental assessments and statements.

Effects on the park are discussed in Chapter 7 of Volume II. As stated in Volume II, page 7-29, *"...rocket launches will occasionally disrupt the wilderness character of the back country portions of the Park."* It is pointed out, however, that the facility includes a large undeveloped area adjacent to the Park that will remain in its wilderness state as open space. On page 7-26, the dEIS states, *"...it is unlikely that these lands will remain undeveloped indefinitely without a spaceport."* Although a spaceport would predispose Ka'u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the PCZ, the project area would be mostly open space.

The archaeological survey of the coast has shown that archaeological sites and Hawaiian habitation are clustered in areas where there is access to the coast. The survey has also shown that archaeological sites within the 1823 lava flow, which covers much of the National Park boundary area is nearly devoid of archaeological sites, except in *kipuka* areas not covered by this flow. Both of these factors contribute to the existence of an archaeologically barren zone within a half mile or more on either side of the National Park boundary (both inside and outside of the park). As stated in the archaeological report, the nearest archaeological sites within the park boundary lie approximately 7000 feet from the nearest habitation sites along the coast west of the park boundary (the Punahaha lava tube complex).

It is true that the 1823 lava flow could have covered archaeological sites and that these areas could once have been connected by continuous sites. We will never know the answer to this question. The settlement pattern showing habitation clustered in areas with access to the coast, however, and absence of sites in steep cliff areas (characteristic of the National Park boundary area) indicate what has always been a barren area, even before the 1823 lava flow.

As discussed in Chapter Seven of Volume II, archaeological and cultural sites within the project area would be preserved or recovered according to a preservation plan that meets requirements of Chapter 6e, Hawaii Revised Statutes. The preservation plan would be developed in consultation with the Historic Preservation Division of the Department of Land

and Natural Resources. An Archaeological Preserve would be created to ensure the preservation of significant resources for future research and public appreciation.

Comment: *The true probability of a launch accident has been severely underrated in the dEIS, particularly when it is taken into account that this facility would be built in Lava Zone 1, in a area known for its strong earthquakes and massive cracks in the ground. The health studies in the dEIS would need to be repeated using a more realistic launch accident probability of at least one in 15 years based on the accident rate at existing facilities. What would be the expected health effects in this case?*

Response: If volcanic activity is anticipated or has begun that will affect the area of the facility, all launch activity should stop and all toxic materials (e.g. propellants) should be removed to an area not impacted by the volcanic activity. Under no condition could launches be allowed concurrently with any significant neighboring volcanic activity.

The purpose of the dEIS is to assess the hazards based on the conceptual plan and provide suggestions of possible mitigations. A careful engineering seismic risk analysis should be performed, as specifically recommended in Appendix IIIA, (page 19):

> *" A complete and comprehensive seismic risk analysis is recommended as a means of qualifying and systematically evaluating seismic risks and mitigation alternatives. Such an approach requires detailed risk modeling and analysis which is beyond the scope of this report. A complete seismic risk analysis must be based on a detailed design of the facility, which begins with the specification of seismic design criteria as suggested herein. Facility layout and design-type mitigations are employed during the design phase to limit earthquake-related risks. Additional risk mitigation opportunities are available in the specification of normal and emergency operating procedures. "*

The unpredictability of earthquakes is recognized, as stated on page 20 of the seismic risk report (*"A primary difference between volcano and earthquake risks is that volcanic activity is more predictable"*). Because most earthquakes on the Island of Hawaii are associated with volcanic activity, the large damaging earthquakes are usually preceded by significant fore shock activity. A period of unusual seismic activity preceded the 2 April 1868 Great Ka'u earthquake including several moderate fore shocks (beginning as early as 9 March 1868, with a swarm beginning on 17 March 1868. Likewise, significant fore shocks, including a M_S=5.7 event, were felt prior to the 29 November, 1975 Kalapana earthquake. Thus, when seismologists at Hawaii Volcanoes Observatory (HVO) record enhanced seismic activity, associated with magma up welling, inflation or deflation, etc., an earthquake watch and warning system (such as implemented in California) could be engaged whereby an imminent earthquake hazard could be recognized.

Hawaii is fortunate that magma movement and possible large earthquakes are associated with such precursory activity—volcanic eruption and earthquake advisories are possible! Although false alarms may be unavoidable, where no large damaging earthquakes follow enhanced seismic activity, the simple mitigating procedures suggested in the dEIS (such as leaving fire suppression equipment outdoors, or garage doors open on fire stations) would have negligible adverse consequences on regular activities at the spaceport or in the affected communities.

Hawaii is one place in the entire world where anticipation of damaging earthquakes based upon premonitory seismicity (or other precursory phenomena like ground uplift and subsidence) is likely to occur. The historical record of seismicity substantiates this proposition. These seismicity patterns have already been used successfully to predict major eruptions of volcanoes, including Mt. Saint Helens in Washington state, Mt. Pinatubo in the Philippines, and Kilauea in Hawaii.

Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire Island of Hawaii. Furthermore, as stated in the Appendix (page 19, paragraph 2), the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard, albeit without a formal, quantitative risk analysis, so that the appropriate decision-makers could decide whether to proceed or abandon the project. The dEIS stated the hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the proposed project were to proceed.

Ground subsidence is discussed in the dEIS under geologic hazards and earthquakes (Appendix IIIA). This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Appendix IIIA). As stated on page 13 of the Appendix, *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment notes: *"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal*

areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up." The ACTA report continues *"... regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka'u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."*

Additional data regarding ground subsidence and cracking is presented in the ACTA report describing specific historical events such as the 2 April, 1868 and 29 November, 1975 earthquakes. Furthermore, the ACTA report discusses the earthquake-induced ground failures including "extension and contraction failures (cracks)" and "coastal inundation resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are specifically addressed in the ACTA Seismic Risk Assessment for the three "design" earthquakes under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS recommends "siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report." (Appendix IIIA). More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in the Appendix. Specific mitigations mentioned include: *"locate hazardous facilities away from known geologic hazards;"* and *"carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."*

The Health Risk Assessment (HRA) is based on the reasonable maximum exposure (RME) scenario specified by EPA in its "Risk Assessment Guidance for Superfund." This RME scenario is defined as the highest exposure that is reasonably expected to occur at a site. According to EPA RAGS, "The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures." Because exposures from conflagration or deflagration occur on a single event basis (and there is no way to predict when they would occur), the health effects are evaluated on the basis of a single exposure over a 70 year lifetime. Multiple exposures are easily derived by multiplying the single exposure risks by the number of exposures.

The HRA analyses are conservative overestimates because the effect of mitigating measures are not included. Launches will be constrained (held), if the meteorological conditions, in combination with the hazard of the accident, produce unacceptably high levels of toxicity to the nearby communities.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."

Comment: *The dEIS neglects to list the Pahala Senior Citizens Center and the Pahala Elderly Housing on its Sensitive Receptor list. What would be the procedure in which they and others would be warned of an accident and evacuated in time to prevent illness and loss of life?*

Response: In an inadvertent oversight, these two facilities were not noted by RSA personnel during a site visit to Pahala conducted in February 1992. RSA would like to thank the commentor for pointing them out in her comments on the dEIS.

The exact location of these two facilities, as well as additional modeling, would be required to precisely quantify potential risks at these facilities due to spaceport activities. However, because three other sensitive receptor locations within the town of Pahala were quantitatively evaluated in the human health risk assessment (Pahala Preschool, Ka'u High and Pahala Elementary School, and Ka'u Hospital; see Table 3-1 of Appendix VIIIA), the risks at these two senior centers will not be significantly different than those already calculated. The Pahala Preschool is the closest to the proposed facility, located at the edge of the town closest to the site of the proposed spaceport. Thus, assuming that Pahala Senior Center and Pahala Elderly Housing are not located significantly closer to the proposed facility than Pahala Preschool, the risks at these two sites would be less than or equal to, but probably not greater than, the risks at Pahala Preschool. Cancer and noncancer risk estimates for Pahala, under worst case weather conditions and under more likely weather conditions, are listed in Tables 13-1 and 13-2 of the health risk assessment, respectively.

Comment: *Appendix XE of the DEIS, last paragraph...states that 'The State will be self-insured for lawsuits that are unrelated to launches or activities of spaceport but still affect spaceport (e.g., fires or other natural disasters outside the PCZ boundary that cause delays with spaceport; delays in construction of the infrastructure, etc.). Are the taxpayers to pay the developer in case the spaceport construction is delayed, perhaps permanently, by a lava flow or mountain flood originating outside the PCZ boundary? It certainly sounds that way. Can we afford underwriting this venture in this way?*

Response: Even though the State chooses to be self-insured rather than carrying individual insurance policies on all State-owned properties, the State would still be in a position to protect itself from being liable to the launch companies for a delay in construction due to a lava flow or mountain flood originating outside the PCZ boundary. This could be accomplished through

the legal documents that would be negotiated with the launch companies (see Appendix XE). In these documents, the launch companies would agree to assume the risk of loss due to natural disasters; they would then take out whatever insurance coverage they deemed necessary to protect themselves against the risk of natural disasters.

To insure this, the Management Plan (Appendix E referenced above) could specifically indicate that the State will not be liable to the launch companies or the Consortium for natural disasters such as fires, earthquakes, or lava flows, within or outside the Population Control Zone.

Comment: *Future expenditures toward the economic development of Ka'u would be better spent on community-based models such as is currently being pursued by Naalehu MainStreet and the Ka'u Community Development Corporation.*

Response: It would indeed be desirable for the residents of Ka'u to continue to pursue community-based economic development (CBED). This approach is consistent with our history in the United States, where most successful development is achieved by local entrepreneurs who receive little or no direct government assistance.

Nevertheless, government can still play a pivotal role in facilitating development that is beneficial, yet cannot be spawned from resources within a community. On the Big Island, the Mauna Kea Observatories may be the best example of this.

Furthermore, a development such as a launch facility, if successful, would benefit CBED by expanding opportunities for local entrepreneurs (see Appendix IXA). New opportunities for local entrepreneurs (ibid.). New opportunities would be presented to supply goods and services to companies and workers at the launch facility, existing Ka'u residents who would have more spendable income, new residents, and visiting workers.

In pursuing CBED, the goals and wishes of Ka'u residents are obviously critical, but in the process of setting their goals, residents must consider which activities are *economically feasible* in Ka'u, given its remote location, its distance from markets, and its limited support services for businesses. Simply put, for most new business activities, Ka'u does *not* offer a comparative advantage over other places in Hawaii; that is, in most cases, it would be more profitable for economic activity to locate elsewhere.

For example, diversified agriculture is often mentioned for CBED by residents throughout the State—not just by those who live in Ka'u. However, the best place in Hawaii for most crops is Central Oahu on lands currently being released from sugar production by Oahu Sugar Co., Ltd. Such lands are among the best farm lands in the State: soils are deep

with good machine tillability, the area is very sunny, and an ample supply of very low-cost water is available. Furthermore, these lands are ideally located for agriculture due to their proximity to the large Honolulu consumer market, to supply markets, and to overseas air and surface shipping terminals. Thus, for most crops, Central Oahu has a strong comparative advantage over Ka'u. Crops will indeed be grown in Ka'u, but the opportunities will be limited by comparison to Central Oahu.

Overall, it is difficult to be optimistic about the prospects for full employment in Ka'u, even if CBED and a launch facility are realized. Ka'u needs jobs for existing unemployed workers, for those who will be laid off soon from Ka'u Agribusiness Co., for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. It is possible that new resorts will provide jobs, but after many attempts over the years, significant resort development has yet to be realized in Ka'u. And while diversified agriculture is expected to expand, it will not be sufficient to provide full employment.

References:

Howard, P.H. 1991. Handbook of Environmental Degradation Rates. Chelsea, Michigan: Lewis Publishers, Inc.

Hazardous Substances Data Bank (HSDB). 1992. Electronic communication with HSDB of the National Library of Medicine.

12-422

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Linda Holmes Peebles Date: 12/1-93

Name and address:

Linda Holmes Peebles
PO Box 1418
Kealakekua HI 96750

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th Floor
Honolulu, Hawaii 96813

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGE
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

SEP. 30 1994

Ms. Linda Holmes Peebles
P.O. Box 1418
Kealakekua, HI 96750

Dear Ms. Peebles:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-423

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

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I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Pamela Arden Philip

Date: 11/18/93

Name and address:

Pamela Arden Philip
PO BOX 3732
SANTA FE NM 87501

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-424

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Ms. Pamela Arden Philip
P.O. Box 3732
Santa Fe, NM 84501

Dear Ms. Philip:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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SEP. 30 1994

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-425

12-426

September 21, 1993

E. D. Quimby
P.O. Box 6161
Captain Cook, HI 96704

Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Governor Waihee:

For 35 years I have lived and travelled about these bountiful islands, enjoying the natural beauties and varied attractive habitats of each, delighting in the clean air and clear waters.

During my earlier years on Oahu, I could not help but note the impression of superior health and serenity in crowds there in contrast to those on the mainland.

Since residing in the relative peace of this spacious island, I have noticed how the people who have moved here seem to improve in their general well-being, regardless of their age, to the point where it seems most fitting that this island orient its future toward becoming a restorative center for States, if not for the world. It is difficult to visualize a more comfortable climate, inspiring surroundings, hospitable populace, unique Hawaiiana, conducive atmosphere and accommodation space for rest and recreation, and even retraining. Surely, so ideal a combination is rare, and a prize not to be sacrificed.

Such a vision does not include any room whatsoever for a space airport under any conditions. Those in my acquaintance who might accept such an intrusion into the basic nature of this Pacific Island cannot be seeing too clearly or thinking into the future with sufficient breadth of imagination, to forestall ruination of this divinely conceived place, in my view of realities. And I cannot comprehend how people in families with children can even consider such an eventuality as desirable or suitable for these offspring, or beneficial for their upbringing.

In case this whole space project is kindled by money motives, please reconsider, in the frame of the degraded ecological state of our planet. At this stage, how can financial gain remain a priority with anyone?

By a conversion to a health center approach, many of our local institutions could profit while upgrading the situation of people in residence here: via –

1. More diversified agriculture to ensure food freshness (with greater nutritive support) and sufficient quantities locally.
2. Teaching jobs for sundry professionals.
3. A wide range of care helper jobs.

With much aloha from Hawaii,

E. D. Quimby

E. D. Quimby

P.S. GOVERNOR, HAVE YOU NEVER WISHED TO BE KNOWN OVER TIME AS A WISE AND FAR-SEEING GUIDE TO HIS PEOPLE, WITH ROBUST HEALTH AS THE WEALTH BASIC TO ALL OTHERS?

E.D.Q.

'93 OCT 1 AM 9:24
OFFICE OF THE GOVERNOR
ED

93-314-F

[redacted]

Draft reply for Governor's signature
Draft reply for Director's signature
Direct reply (carbon: Director)
Comment/Recommendation
Follow-up/Report
Your information/file
Keep endorsement(s)
Return endorsement(s)
Other App. Attention

Due date

KNITT XR
RF
RF/Filing

October 13, 1993.

Ms. Hannemann,

Helene Hale requested I mail you a copy of this letter which I sent to her earlier.

For 35 years I have lived and travelled about these bountiful islands, enjoying the natural beauties and varied attractive habitats of each, delighting in the clean air and clear waters.

During my earlier years on Oahu, I could not help but note the impression of superior health and serenity in crowds there in contrast to those on the mainland.

Since residing in the relative peace of this spacious island, I have noticed how the people who have moved here seem to improve in their general well-being, regardless of their age, to the point where it seems most fitting that this island orient its future toward becoming a restorative center for the States, if not for the world. It is difficult to visualize a more comfortable climate, inspiring surroundings, hospitable populace, unique Hawaiiana, conducive atmosphere and accommodation space for rest and recreation, and even retraining. Surely, so ideal a combination is rare, and a prize not to be sacrificed.

Such a vision does not include any room whatsoever for a space airport under any conditions. Those in my acquaintance who might accept such an intrusion into the basic nature of this Pacific Island cannot be seeing too clearly or thinking into the future with sufficient breadth of imagination, to forestall ruination of this divinely conceived place, in my view of realities. And I cannot comprehend how people in families with children can even consider such an eventuality as desirable or suitable for these offspring, or beneficial for their upbringing.

In case this whole space project is kindled by money motives, please reconsider, in the frame of the degraded ecological state of our planet. At this stage, how can financial gain remain a priority with anyone?

By a conversion to a health center approach, many of our local institutions could profit while upgrading the situation of people in residence here:

1. More diversified agriculture to ensure food freshness (with greater nutritive support) and sufficient quantities locally.
2. Teaching jobs for sundry professionals.
3. A wide range of care helper jobs.

With much aloha from Hawaii,

E. D. Quimby

E. D. Quimby

Copies also mailed to our Mayor, Governor, Andy Lewin, Patsy Mink, Keiko Bonk-Anderson + Lt Governor.

P.S. As a researcher of survival, health, organics, lifestyle, gardening and a designer of household items, floor plans + lot layouts, I've long visualized an island-wide assortment of retreats for promoting health, regeneration and retraining on this handsome island.

I'm planning to, furthermore, send copies to the Visitor's Bureau and the U. of Hawaii.

E.D.Q.

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu Hawaii 96813
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SEP. 30 1994

E.D. Quimby
P.O. Box 6161
Captain Cook, HI 96704

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear E.D. Quimby:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-428

KRP Information Services and Decision Analysts Hawaii, Inc. contributed to this response.

Comment: *The proposed spaceport is incompatible with the environment of Ka`u. Why not have a health center instead?*

Response: A health center could indeed contribute to the economy. In order to make a significant contribution to full employment in Ka`u, however, a health center would have to be of a size similar to that of a major resort. Although health centers have been explored in the past by various developers, a profitable market for a large one in Hawaii has yet to be proven.

Furthermore, it is not clear that Ka`u would be the best site for such a major health center. If a health center should become economically feasible, it may be more profitable to build such a facility in a community that: (1) is already adequately serviced by roads, water, sewers, an airport, etc.; (2) has ready access to a nearby pool of health services; (3) would be supported by a variety of nearby companies that can provide the necessary goods and services; and (4) would have consistently clean air rather than being downwind from an active volcano, as is the situation in Ka`u.

c: Ken Munechika, DBEDT

SEND COPIES TO
APPROPRIATE PARTIES

NOV 17 1993 POSTED

Homescapes
Allison Ray
P.O. Box 374
Volcano, Hawai'i 96785
Nov 17, 1993

'93 NOV 18 P1:34

OFC. OF ENVIRONMENTAL QUALITY CONTROL

Governor, State of Hawai'i
c/o Office of Environmental Quality Control
220 S. King Street
Honolulu, Hawai'i 96813

Re: Conceptual plan for a commercial satellite launching facility at Palima Point.

Dear Governor John Waihee,

I strongly protest against the continuance or the acceptance of the "Draft Environmental Impact Statement" (DEIS) regarding the "Spaceport" on this island for the following reasons:

There has been insufficient disclosure to the public on the risks involved in such an operation. The risk of nuclear & chemical fuels ranges from stress to death. Not only for the people, but for all the inhabitants present & future.

It is becoming well known, too, that one of the purposes for the rocket- launching facility is to send radioactive waste toward the sun. The plan is to ship the wastes by sea to Hawai'i, transfer the radioactive material to trucks, drive from Hilo, through our Volcano International Biosphere, down to South Point to be transferred again to rockets.

This is criminal insanity for several reasons; danger and risk to everyone all along the path, possible human error and mechanical failure in transport, handling, and storage, etc.

And, that this form of waste disposal is safe can only be theoretical.

There is also documented evidence that every time a rocket is launched, the ozone hole increases exponentially; something we know we should avoid at all costs.

How can we be so arrogant as to take all these risks? How can the money be so much more important than the danger to all involved?

How can you propose that this will create jobs that anyone here would aspire to, let alone be qualified for?

How could any "Environmental" impact statement ever sanction all this??

I support the immediate & total withdrawal from the DEIS process & DO NOT authorize Governor John Waihee to continue with this project. Enough of our money has been wasted already. Please look to your wisdom.

Sincerely,

12-429

Homescapes
D. Hunter Beyer
Allison Ray
P.O. Box 374
Volcano, Hawai'i 96785
Nov 17, 1993

Governor, State of Hawai'i
c/o Office of Environmental Quality Control
220 S. King Street
Honolulu, Hawai'i 96813

Re: Conceptual plan for a "Spaceport" on the Big Island of Hawai'i.

Dear Governor John Waihee,

I strongly protest against the continuance or the acceptance of the "Draft Environmental Impact Statement" (DEIS) regarding the "Spaceport" on this island for the following reasons:

There has been insufficient disclosure to the public on the risks involved in such an operation. The risk of nuclear & chemical fuels ranges from stress to death. Not only for the people, but for all the inhabitants present & future.

It is becoming well known, too, that one of the purposes for the rocket- launching facility is to send radioactive waste toward the sun. The plan is to ship the wastes by sea to Hawai'i, transfer the radioactive material to trucks, drive from Hilo, through our Volcano International Biosphere, down to South Point to be transferred again to rockets.

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I support the immediate & total withdrawal from the DEIS process & DO NOT authorize Governor John Waihee to continue with this project. Enough of our money has been wasted already. Please look to your wisdom.

Sincerely,

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
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SEP. 30 1994

Ms. Allison Ray
Homescapes
P.O. Box 374
Volcano, HI 96785

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Ray:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-430

ACTA Inc. and Risk Science Associates contributed to the following responses.

Comment: *I strongly protest against the continuance or the acceptance of the dEIS regarding the spaceport on this island for the following reasons. There has been insufficient disclosure to the public on the risks involved in such an operation. The risk of nuclear and chemical fuels ranges from stress to death. Not only for the people, but for all the inhabitants present and future.*

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the Health Risk Assessment, *"Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures."* The health risk assessment uses algorithms described in EPA methodology that are *"conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."*

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. *"The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide"* (page S-4 of Volume I). Similarly, *"The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant"* (page S-8 of Volume I).

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, *"On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:*

Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."

Comment: *It is becoming well known, too, that one of the purposes for the rocket launching facility is to send radioactive waste toward the sun. The plan is to ship the wastes by sea to Hawaii, transfer the radioactive material to trucks, drive from Hilo, through our Volcano International Biosphere, down to South Point to be transferred again to rockets. This is criminal insanity for several reasons; danger and risk to everyone all along the path, possible human error and mechanical failure in transport, handling, and storage, etc. And, that this form of waste disposal is safe can only be theoretical.*

Response: You are correct in your conclusion that transporting radioactive wastes across the sea to Hilo and then by land to the Ka`u District to be launched by rocket ships to the sun would be a very foolish thing to do. Fortunately, despite what you may have heard, there is no plan to do any such thing.

In 1973, James Schlesinger, then chairman of the Atomic Energy Commission, asked NASA to consider shooting high-level radioactive wastes into the sun aboard the space shuttle. NASA rejected the idea on the basis of high risk and costs. In 1991 the Congressional Research Office looked into the concept again and concluded that, while the idea is technically feasible, high costs and risks would be problematic.

We have no knowledge of any plan ever seriously proposed to launch nuclear waste from any spaceport. Safety and economics make the concept not feasible. From an economic standpoint, the payload capabilities of the two biggest vehicles discussed (Delta II and Atlas IIAS) are at the very most 2000 lb. and 4100 lb. for placing a satellite in a geosynchronous orbit around the earth. No data are available about the sending of a payload to the sun using these boosters, but it takes considerably more energy than to get into a geosynchronous orbit. Thus the payload capabilities are even less than those noted. An enormous amount of spent nuclear power plant fuel is located at the sites of the U.S. nuclear power plants. Since the nuclear waste is so heavy, and the payload capabilities of the rockets are so limited, it will be impossible even with a very rapid launch schedule to even put a dent into the amount of waste that needs to be eliminated. Moreover, the high launch costs to place a payload into that type of path/orbit (up to $40,000 per pound), are prohibitive.

In addition, there are safety considerations. At this time in the United States, there is minimal to no allowed movement of radioactive waste by truck or any other means of transportation. Thus, the likelihood of waste even getting to a port is very, very small. Currently almost all nuclear power plant spent fuel remains on the power plant site. With such strict safety rules, it has no place to go.

Spent fuel is highly radioactive and much of the material is extremely toxic as well. Containers used in the transport of nuclear materials must provide shielding from radiation and must be sturdy enough to prevent spillage of the material should an accident occur during transport. Containers suitable for stowing nuclear waste payloads have not been designed, but the shielding and survivability requirements would mandate relatively massive containers further reducing the amount of waste that could be launched into space. Admittedly, the disposition of nuclear waste is an enormous problem, but sending it into space is not the solution.

A final important note: the nuclear power generators on board some spacecraft are small devices. Containers for these devices would not be suitable for storage of spent fuel due to fuel handling problems inherent in dividing the material into many small containers and due to the inefficiency of storing many small containers in the payload compartment.

Comment: *There is also documented evidence that every time a rocket is launched, the ozone hole increases exponentially; something we know we should avoid at all costs.*

Response: It is understood that emission by-products from rocket motors will deplete atmospheric ozone. Of biggest concern is the potential depletion of stratospheric ozone through either migration of ozone depleting compounds from the troposphere to the stratosphere or direct injection of ozone depleting compounds into the stratosphere. Effects from this depletion can be both local and global. Local effects include the potential for an "ozone hole" to form along the launch corridor. NASA has indicated that even though rocket launches can have a significant effect on the stratosphere by reducing the ozone substantially (perhaps >80 percent) within the expanding exhaust plume up to 3 hours after launch (World Meteorological Organization, 1991), the corresponding column ozone depletion is less than 10 percent.

There have been some questions raised regarding the validity of the 10 percent reduction claim and research is on-going that addresses the ozone reduction question. In any event the reduction is not exponential and recovery in the launch column begins within about three hours after launch.

On a global scale, the contribution of the rocket launches is addressed on page 5-161 of Volume I and Appendix XD. The analyses performed indicated a depletion of stratospheric ozone of about 0.009 percent/year. On page 5-162 it is also noted that the contribution of gases related to global climatic effects would not be eliminated if the launch facility is not constructed in Hawaii because the launches would still take place somewhere else.

Comment: *How can we be so arrogant as to take all these risks? How can money be so much more important than the danger to all involved? How can you propose that this will create jobs that anyone here would aspire to, let alone be qualified for?*

Response: The dEIS discloses the potential hazards (not what *will* happen, but what *could* happen) of the launch facility. The risks (the combination of the probability and consequence) of an event would be determined if an actual project is planned. We do not know what kinds of hazards or mitigating measures exist for a specific project, however, the primary objective of the State would be to ensure safety to the public. There is no basis for the assertion that money is more important than safety.

The launch facility would provide a considerable number of employment opportunities for Big Island and Ka'u residents. As discussed in Appendix IXA, and Chapter 6 of Volume II, the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka'u.

The estimated 290 jobs for the local labor force in Ka'u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the space industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In the early 1970s, a number of people opposed building telescopes atop Mauna Kea. Many asserted that the telescopes would provide few jobs to Big Island residents since local residents would not be skilled enough to compete for these positions. As it has turned out, however, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents.

Experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels—not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy,

universities, airports, hospitals, computer companies, etc. If the launch facility is built, it will also be true there.

Comment: *How could any "Environmental" impact statement ever sanction all this?*

Response: We disagree with your statement that the dEIS "sanctions" the project. The dEIS discloses facts and study results and proposes mitigating measures, while avoiding conclusions as to the acceptability or non-acceptability of the impacts disclosed or the efficacy of the mitigating measures presented. The EIS is intended to provide factual data to be used as the basis for making informed decisions. This is in accordance with the definition promulgated in the Environmental Impact Statement Rules, (Title 11, Chapter 200, Section 11-200-2) which states that:

> *"...an EIS means an informational [emphasis added] document prepared in compliance with chapter 343, Hawaii Revised Statutes and this chapter and which discloses [emphasis added] the environmental effects of a proposed action, effects of a proposed action on the economic and social welfare of the community and state, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects to the action and their environmental effects."*

In compliance with Chapter 343, Hawaii Revised Statutes and the Environmental Impact Statement rules, the dEIS attempts to disclose all significant impacts (both positive and negative), generated by certain activities and accidents related to the project, in a non-judgmental manner. The objective is to provide as complete information as possible to the agencies and legislative bodies that will make the final decision as to whether or not support of the project should be continued. There are also a number of unresolved issues listed on page S-15 that, upon assessment, could play a significant role in determining whether the spaceport benefits outweigh the impact.

Comment: *I support the immediate and total withdrawal from the dEIS process and do not authorize Governor John Waihee to continue with this project. Enough of our money has been wasted already.*

Response: The EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns in the context of a conceptual plan. Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address those public and agency comments raised during this public review period. The State funded the EIS to disclose the impacts of building a spaceport, which the EIS does, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

Reference

World Meteorological Organization: Scientific Assessment of Ozone Depletion: 1991. World Meteorological Organization Global Ozone Research and Monitoring Projects – Report number 25. National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, United Kingdom Department of the Environment, United Nations Environment Program, World Meteorological Organization.

1) KEM
2) RF
3) BT
4) BF/filing

September 22, 1993

The Honorable Governor John Waihee
State Capitol
Honolulu, HI 96813

Dear Sir,

Please do not allow a spaceport here in Hawaii. Not in the state or on the Big Island. It will adversely and irreversibly affect the culture, environment and health of our people. I speak for myself and for every person I have discussed this with.

Sincerely,

A registered voter living on the Big Island

cc: U.S. President William Clinton
Senators: Daniel Akaka
Daniel K. Inouye
U.S. House Patsy Mink
State Senator Andrew Levin
County Council Keiko Bonk-Abramson

12-434

Registered Voter
No Name or Return Address

Comment: *The proposed spaceport will adversely and irreversibly affect the culture, environment and health of our people.*

Response: Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed--and the efficacy of the mitigating measures presented--is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement--which would be the responsibility of the private developer--and various licenses, permits and agreements with State, County and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

SEND COPIES TO
APPROPRIATE PARTIES

FILE

'93 NOV 24

QUALITY

22 Nov 93

Dear Sir:

Pathetic, ain't it? The people don't want it, business don't want it, the county council don't want it, Lockheed don't want it, and America don't need it. Can you explain to me why you need to throw bad money after bad?

No, you clown, you won't help anyone by completing the spaceport EIS. It's called making a mistake and then owning up to it. Four-year-olds have been known to do it. Try it. It's not hard. Say over and over again until it penetrates: I'm sorry. I made a mistake and I'm sorry.

Sincerely,

Glenn Robinette

Glenn Robinette
Box 10115
Hilo, HI 96721

c: Ken Munechika, DBEDT

12-435

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

SEP. 30 1994

Mr. Glenn Robinette
P.O. Box 10115
Hilo, HI 96721

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Robinette:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

October 19, 1993
Mountain View, HI

To: Governor of Hawai'i
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hi 96813

From: Don Rogers
18-4169 Heno St.
Box 1105
Mountain View, HI 96771

Subject: Draft Environmental Impact Statement titled "Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point, Ka'u, Hawaii".

Dear People:

I am a retired Engineer from the University of California at Berkeley, who was involved in research with that institution for thirty years. I moved to Hilo in January of 1989, and built a home for myself here in Mountain View a year later. I am very pro technology, for instance I think that Geothermal power generation is an excellent idea.

I was asked to read the EIS because of my engineering background, and had no opinion on the subject before doing so. After having read it, I can see no reason to spend any more money on this project, and lots of reasons not to. The risks from transporting very toxic and hazardous materials (such as hydrazine and nitrogen tetroxide) through highly populated areas like Hilo are simply unacceptable.

The very large and heavy trucks would destroy highway 11 in a very short time. Some of these trucks mentioned in the EIS are twice as long and twice as heavy as the largest trucks currently allowed on the highways of California. If these trucks are allowed on highway 11, it will look like a washboard in a very short time. A large part of highway 11 is 5 to 6% grade. How will cars be able to get around these trucks when they are traveling five miles per hour and are sixteen feet wide.

When I started to work for the University of California, their computer occupied a building a block square by two stories high. That computer had less computing power and was less reliable than a $15 hand held calculator of today. The reason for that incredible reduction in size, is the invention of the Integrated Circuit. Well I ran the integrated circuits lab at UC Berkeley at the time I retired, and I can tell you there has been a similar reduction in the size of integrated circuits since this space port was originally proposed. In the last seven years there has been a ten thousand to one increase in the amount of information an integrated circuit can contain. That means that the satellites that are being designed today can be much smaller, and do not need ground based launching facilities. They can easily be launched from the belly of a high flying plane at one tenth the cost. This rocket launch facility is obsolete. There is no need for it at all.

There are areas along highway 11 (like the one I live in) with only one road in or out. What is your evacuation plan for Paradise Park Mountain View Manor? This development has only one access, North Oshiro Road, and the entire community of potentially several thousand, is all within one kilometer of the intersection of Oshiro Road and highway 11. If there were a spill at that intersection, I would like to know how you could evacuate us.

There are many more reasons not to do this project, but they have been enumerated by others, and I will not bore you by repeating them.

I am glad to see that someone is thinking about this part of the state, but wish that the money that has been spent on this project could have been spent on projects that would benefit the state more. The money this project will cost, if built, could create ten times as many jobs if spent more wisely. The main reason this Island is so poor, is that we import nearly all our consumables. We need to produce more of our food and products here. This island could easily feed the whole state. We need factories and farms, not rocket launch facilities. And please lets have these farms and factories be locally owned, so that the profit from them stays here, and is re-circulated within the state, and not taken back to the mainland, or worse yet, some foreign country.

Sincerely,

Don Rogers

Don Rogers
(808)968-8776

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

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SEP. 30 1994

Mr. Don Rogers
Box 1105
Mountain View, HI 96771

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Rogers:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-437

ACTA Inc., Decision Analysts Hawaii, Inc., and Risk Science Associates contributed to the following responses.

Comment: *The very large and heavy trucks would destroy highway 11 in a very short time. Some of these trucks mentioned in the EIS are twice as long and twice as heavy as the largest trucks currently allowed on the highways of California. If these trucks are allowed on highway 11, it will look like a washboard in a very short time. A large part of highway 11 is 5 to 6% grade. How will cars be able to get around these trucks when they are traveling five miles per hour and are sixteen feet wide.*

Response: As noted in Chapter 4 of Volume I, the roads providing access to the project site will be improved to State DOT (HDOT) specifications. Oversize loads would be subject to HDOT review and approval. Several launch vehicles evaluated in the dEIS are currently transported by truck and launched from Vandenberg Air Force Base in California, therefore, these vehicles *are* allowed on the California highways.

The dEIS also mentions the inevitable congestion that will result from transporting large or hazardous materials. On page 4-22, the dEIS states,

> *"Some drivers will be highly annoyed and may resort to unsafe passing maneuvers; emergency vehicles may be temporarily slowed down."*

Comment: *The satellites being designed today can be much smaller, and do not need ground based facilities. They can be easily launched from the belly of a high flying plane at one tenth the cost. This rocket launch facility is obsolete. There is no need for it at all.*

Response: Because technology is constantly evolving to enable miniaturization in electronics, (as you indicated with regard to the integrated circuit), it is reasonable to assume that satellites can be made much smaller. Several projects have been proposed that would utilize a "constellation" of small satellites instead of the the larger communications satellites currently in service. Most of the worldwide commercial launches, however, utilize medium- to heavy-lift launch vehicles. In addition, most of the small satellite projects that have been proposed will probably use a single larger rocket to launch several satellites at once.

With regard to Pegasus, this is a relatively low-cost delivery system for small satellites (up to about 1,100 pounds), but is unsuitable for launching the medium-sized satellites (up to about 17,000 pounds launched from an Atlas/Centaur rocket configuration) that are envisioned for the Hawaii spaceport.

The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors are convinced that there is no need for a Hawaii ground-based launch facility.

Comment: *There are areas along Highway 11 (like the one I live in) with only one road in or out. What is your evacuation plan for Paradise Park Mountain View Manor? This development only has one access, North Oshiro Road, and the entire community of potentially several thousand, is all within one kilometer of the intersection of Oshiro Road and Highway 11. If there were a spill at that intersection, I would like to know how you could evacuate us.*

Response: In the event that a surface evacuation route is blocked, helicopter evacuation would be necessary if people were considered to be in danger. This type of circumstance needs to be considered by local civil defense units and coordinated with the local fire, police and other relevant emergency service groups. If the project were to proceed, then emergency response plans must consider such contingencies.

As stated in Appendix VIB (page 9-1),

"the mitigation of potential accidents should insure medical and firefighting personnel and equipment are available for emergency response and the services of meteorologists should be available to predict vapor movement to facilitate evacuation requirements."

According to Dr. Greenberg of Risk Science Associates, extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment. It must be remembered that the hazardous materials response team will travel in the convoy and be partially suited-up. Their efforts will be directed immediately toward spill containment after donning respirators and gloves. Anyone who has ever worn full protective equipment or who has even witnessed a hazardous materials response demonstration knows that a self contained breathing apparatus can be donned and the protective suit sealed in a matter of minutes. In fact, the emergency response personnel consulted for this project stated that under these specific conditions of transportation, containment and covering of a one drum spill could be accomplished in 10 minutes.

The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (Appendix

VIA prepared by ACTA and page 5-54 of Volume I). According to ACTA, *"the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."* ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than 1 drum or 1 cylinder per truck accident is considered to be unlikely.

In over thirty years of transporting rocket fuels from the Mississippi River to Vandenberg Air Force Base, ACTA is aware of only a few instances where a release to the environment occurred. ACTA is not aware of any accident where more than one container was breached. Vandenberg Air Force Base receives many rocket fuel shipments each year from the Mississippi River and considerably more in both quantity and volume than would likely be transported within Hawaii. These shipments are highly controlled as regard to the route, hazmat teams, time of day, transporting vehicle speed, etc. Experience, therefore, does not suggest that the breach of more than one container is a reasonable and realistic. ACTA is not aware of even the breach of one 55-gallon drum of hydrazine in a transportation accident in over 30 years of operation of U.S. launch facilities.

It is also possible that the mitigating measures mentioned above may not satisfy public safety concerns. If this is the case, alternative non-toxic propellants could be used, or an alternative harbor near the site could be developed to remove the risks associated with transporting the propellants from Hilo.

Comment: *The main reason this Island is so poor is that we import nearly all our consumables. We need to produce more of our own food and products here. This island could easily feed the whole state. We need factories and farms, not rocket launch facilities. And please let's have these farms and factories be locally owned, so that the profit from them stays here, and is recirculated within the state, and not taken back to the mainland or, worse yet, some foreign country.*

Response: It is indeed costly to import consumables, as well as durable goods. In most cases, however, production of these items on the Big Island would be unprofitable. And if produced on the Big Island, higher prices for these items and/or financial losses to the producers could lower, not raise, incomes on the Big Island.

Regarding food grown for the local market, it should be noted that the State government has been, and continues to be, very supportive of diversified agriculture in Hawaii. Furthermore, local farmers do grow most crops which are profitable to grow in Hawaii. But they naturally avoid crops for which their production costs exceed import costs. Some reasons why certain imported crops are not grown extensively in Hawaii are: (1) some

crops experience comparatively low yields in Hawaii (e.g., crops which require cool winter or night temperatures, and crops which require long hot summer days); (2) labor costs are relatively high in Hawaii; (3) controlling pests is expensive in Hawaii because Hawaii has no winter freezes to kill off the pests; and (4) production costs are high because the local market is too small to support large mechanized farms. Some crops may be grown profitably in Hawaii during the winter months when imports from the mainland are scarce and expensive, but may be unprofitable during the summer when imports are abundant and inexpensive.

It is true that the Big Island could feed the whole State. In fact, only a few thousand acres are needed to grow the profitable crops which are consumed in Hawaii. The best locations in the State for high-elevation crops are Waimea, Hawaii, and Kula, Maui. But for low-elevation crops, the best location for supplying the large Honolulu market is *not* the Big Island; it is Central Oahu where thousands of acres are being released from sugar production by Oahu Sugar Co., Ltd. Agronomic conditions are excellent (good soils, sunny conditions, gentle-sloping terrain, and ample supplies of low-cost water), and the fields are located near the large Honolulu consumer and supply markets.

Regarding your comment that farms and factories should be locally owned, most truck farms and most small businesses in Hawaii are locally owned. Nevertheless, economies which are open to competition—which includes ownership by "outsiders"—generally have outperformed closed economies. Even with outside ownership of a business, most benefits generally occur at the location where the business exists. In particular, wages, the purchase of local goods and services, local property and income taxes, and investment to maintain or improve an asset generally exceed, by a very substantial amount, any profits that may be removed by an outside owner. These benefits occur to Hawaii regardless of whether an outside owner is a U.S. or foreign company.

c: DBEDT, Ken Munechika

13 10 1993

COMMENTS ON THE SPACEPORT ENVIRONMENTAL IMPACT STATEMENT

Date Sept 29th 1993

Dear Governor Waihee,

Please consider my concerns and answer my questions before accepting the spaceport EIS:

one of my [illegible] are [illegible] of sabotage, If there are a [illegible] people against this I don't [illegible] going to take the [illegible] Just a matter of time [illegible] a time bomb with the Hawaiian [illegible] there were any movement [illegible] will just [illegible] future [illegible] of Bases not only would [illegible] but [illegible] West Pacific International [illegible] a vision, and [illegible] a [illegible] site [illegible] [illegible] a [illegible] be [illegible] [illegible] [illegible] a secret Battle field.

SIGNED: Ted A Rosas

(Print Name): Ted A Rosas

ADDRESS: [illegible]

12-440

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGERS
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Mr. Ted Rosas
P.O. Box 700
Naalehu, HI 96772

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Rosas:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

In response to your specific comment:

Comment: *What about sabotage and international terrorism?*

Response: Any public facility is a potential target for terrorist acts. Attached are the procedures that are in force at Vandenberg Air Force Base to counter and control such potential acts, and could possibly serve as a model for the developers of the facility.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Please refer to DBEDT's response to Ruth M. Bass for the THREATCON procedures that were attached to this response.

John Schinnerer
16C Pu'u Hina St.
Hilo, HI 96720
November 21, 1993

DBEDT
Attn: Mr. Takeshi Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Yoshihara,

This letter is to be considered public response to the "Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point" EIS.

First, humans at risk - the risk index for non-cancer risks uses the number 1.0 to indicate that there is a 100% probability that one person exposed to the hazard will be injured in some fashion. The EIS then contains a few indexes as high as 2,490, and numerous that are greater than, say, five. These numbers represent people - people who will be injured when an accident of some type (any type) occurs. It should be clear, then, that the plan is unacceptable. To understand this, imagine the five (or five hundred) people to be you, your family members and/or closest friends. Do not visualize them as some distant, generic, unimportant human beings - there is no such thing. It is clear from the EIS that people will be injured, possibly killed. Their pain and suffering is as unnecessary as the entire rocket launch facility project.

Next - the following discrepancies invalidate the transport studies. An assumption is made that no more than one container of a given chemical is spilled, regardless of the size of the shipment - this is completely inadequate and unrealistic. In addition, 30-minute blanketing time calculations were ignored (although used in the ACTA study) in the health impact calculations done by Risk Science Associates - they used only 15-minute scenarios. Again, inadequate and unrealistic.

Lava flow predictions are difficult to make, but regardless of the predictions (and none are particularly favorable) the site intended for the launch facility is in one of the most active volcanic regions in the entire world, and at the bottom of a natural path of flow (i.e. downhill from the source). Common sense alone would therefore indicate that it is one of the most inappropriate places for such a facility in the entire world - especially when adequate consideration is given to the related seismic activity, which is potentially far more violent than any other location in the United States.

The EIS fails to give adequate value to the undisturbed existence of the area that will be affected by the rocket launch facility. This area and its surroundings are a large part of what little of Hawai'i Island remains at least somewhat untrammeled by man. The natural beauty and renewable natural resources of the area would all be negatively impacted by the proposed facility, both in the short and the long term. Historic and traditional fishing areas and sacred sites would be off-limits (and probably suffer chemical damage as well as soon as the first accident occurred).

This is but an overview of the shortcomings of the EIS and the absurdity of the project. Ten volumes and 2,000 pages make it all but impossible for the public to digest and comment intelligently on more than a fraction of the EIS - this itself is a major flaw in the system. It should in any case be clear by now that the vast majority of the people actually living on this island, and especially those in the near vicinity of Palima Point, are opposed wholeheartedly to the rocket launch facility, and that fact ought to have made this EIS entirely unnecessary in the first place.

Sincerely,

John Schinnerer

JOHN WAIHEE
GOVERNOR
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RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
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SEP. 30 1994

Mr. John Schinnerer
16C Pu'u Hina St.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Shinnerer:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-442

ACTA, Inc, Dr. Richard Brock, Cultural Surveys Hawaii, Decision Analysts Hawaii, Inc., and Risk Science Associates contributed to the following responses.

Comment: *The risk index for non-cancer risks uses the number 1.0 to indicate that there is a 100% probability that one person exposed to the hazard will be injured in some fashion. The EIS then contains indexes as high as 2,490, and numerous that are greater than, say, five. These numbers represent people - people who will be injured when an accident of some type occurs. It should be clear, then, that the plan is unacceptable.*

Response: The hazard index (HI) approach is used to evaluate the potential for chronic or acute noncancer adverse health effects by comparing the estimated dose (or ground level concentrations) with acceptable doses (or acceptable exposure levels - AELs) to obtain a Hazard Quotient (HQ). Acceptable doses or exposure levels are used as indicators of potential adverse health effects and are generally based on the most sensitive noncancer health effect reported in the medical and toxicologic literature. AELs are designed to protect the most sensitive individuals in the population by the inclusion of "margins of safety."

For a single substance, exposure at or below the AEL (i.e., the hazard index is equal to or less than one) is not expected to result in adverse health effects. In the case of exposure to multiple substances with noncancer health effects, it is necessary to calculate a total hazard index. Specifically, when two or more pollutants are present that have a toxic effect on the same organ or organ system, the exposures should be analyzed using a total hazard index approach in which the hazard quotient for each substance is determined and then summed resulting in the total hazard index.

In a health risk assessment, any HI less than 1.0 indicates that no members of the population, including sensitive receptors, will experience adverse health effects. Conversely, an HI that is greater than 1.0 indicates that adverse health effects are likely to occur in some people. This is not a measure of statistical probability and a hazard index of 1.0 <u>does not</u> indicate that "there is a 100% probability that one person exposed to the hazard will be injured in some fashion" as you stated. Rather, the likelihood of an adverse effect occurring in an exposed individual does increase as the HI increases above 1.0, but this depends upon many factors, including individual susceptibility. However, it does not necessarily mean that the severity of the adverse effect will increase as well. That depends upon the adverse effect in question. Sometimes it is an "all or nothing" endpoint; sometimes it is not.

A more straightforward way of understanding the possible adverse health effects that could be experienced resulting from exposure to toxic propellants is obtained using airborne concentrations as the basis. Exposure effects for hydrazine and nitrogen tetroxide are summarized in Tables 1 and 2 of the response to this comment.

Comment: *Discrepancies invalidate the methodology used in transportation risk analysis*

Response: Reevaluation of the transportation accident scenario assuming spill of more than one barrel is not required nor would it be informative because spill of one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers: "The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I of the DEIS). An analysis of multiple drums spilled would just reaffirm the findings of significant risk.

The 15-minute blanketing time is assumed in the transportation accident scenario because "It is assumed that within this 15-minute blanketing time, the toxic hazard spill emergency response team following the transportation truck will be able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it. Thus this analysis addresses the impact of a transportation accident where blanketing is 15-minutes; an emergency response time of less than 15-minutes would result in lower ground level concentrations and correspondingly lower risks. A longer response time would result in higher ground level concentrations and higher risks" (page 10-2 of the health risk assessment in Appendix VIIIA).

Results of the cancer risk analysis for a transportation accident involving one 55-gallon drum of hydrazine and assuming that one accident occurs per lifetime are given on page 10-3 of the health risk assessment: "The maximum cancer risk due to hydrazine under daytime conditions and a 15-minute blanketing time occurs at Location 1 and is equivalent to 1.1×10^{-4}. Under nighttime conditions the maximum cancer risk is 2.2×10^{-5}. Risks due to more than one transportation accident involving hydrazine per lifetime are directly proportional to the values determined in this risk assessment."

Results of the noncancer acute hazard index analysis are also given on page 10-3 of the health risk assessment: *"the maximum hazard index projected to occur due to a transportation spill of hydrazine, 340, occurs at Location 1 during daytime conditions. During nighttime conditions the maximum hazard index at Location 1 is 67. Maximum acute hazard index due to a transportation spill of N_2O_4, 510, occurs at Location 1 during daytime conditions. During nighttime conditions the maximum hazard index at Location 1 is 210. Generally, at all locations, the airborne concentrations of hydrazine would fall below 0.12 ppm [the SPEGL] at 600 - 700 meters from the spill. The concentrations of N_2O_4 would only fall below 1.0 ppm at distances greater than 1000 meters. It should also be noted that the IDLH level of 50 ppm for N_2O_4 would be exceeded at distances up to 100 - 120 meters from the spill site."*

Thus, as indicated in Section 13 of the health risk assessment, *"The individual cancer risk from just one transportation spill involving hydrazine is significant."* On page 13-8, it is stated that *"adverse acute health effects may occur in the surrounding community as a result of these spills."* While recalculation of risks using a longer blanketing time would probably result in greater risks, reevaluation is not required because use of a 15-minute blanketing time has already been shown to result in significant impacts on nearby residents.

Comment: *The launch facility site is in one of the most active volcanic regions in the world, and at the bottom of of a natural path of flow. Common sense alone would therefore indicate that it is one of the most inappropriate places for such a facility in the entire world - especially when adequate consideration is given to the related seismic activity, which is potentially far more violent than any other location in the U.S.*

Response: This site has been selected for a number of reasons, principally because it is very favorable for both polar and equatorial launches. The geologic instability of the area and the risk of volcanic eruption are recognized. The site has been selected despite the obvious hazards for the same reason that people choose to live in Pahala despite the obvious hazards: favorable conditions are seen to outweigh the risks.

The dEIS also implicitly recognizes that inundation by lava would result in catastrophic destruction of the launch facility. Such occurrence would effectively shut down the launch facility permanently. As stated in the dEIS, Volume I, page 4-5:

> *"If the lower Southwest Rift Zone of Kilauea should erupt, however, it is likely that the launch pads would be inundated and destroyed. Lava diversion techniques would only provide a temporary solution. If the rift propagates through the diverters or through the launch pads, there would be no feasible way to prevent destruction of the facilities."*

Several earthquakes of moderate size have affected the Los Angeles metropolitan area within the past 50 years, where vast quantities of hazardous materials, explosive and combustible materials are stored and used, yet no great catastrophe has been generated, even though the exposed population is several orders-of-magnitude greater than that on the entire Island of Hawaii. Furthermore, as stated in Appendix IIIA (page 19, paragraph 2), the seismic risk at Vandenberg AFB has been tolerated, lacking an effective mitigation, because of the critical defense nature of the facility. Such risk may be intolerable at Palima Point, and the dEIS was prepared with the purpose of stating the hazard, albeit without a formal, quantitative risk analysis, so that the appropriate decision-makers could decide whether to proceed or abandon the project.

The dEIS states the geologic hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the

proposed project were to proceed. These factors will be weighed by any developer contemplating building a launch facility at Palima Point.

Comment: *The EIS fails to give adequate value to the undisturbed existence of the area that will be affected by the rocket launch facility. This area and its surroundings are a large part of what little of Hawaii Island remains at least somewhat untrammelled by man. The natural beauty and renewable natural resources of the area would all be negatively impacted by the proposed facility, both in the short and long term. Historic and traditional fishing areas and sacred sites would be off-limits (and probably suffer chemical damage as well as soon as the first accident occurred).*

Response: As stated in Volume II, Chapter Seven and in Appendix IXC, a resident survey indicated a strong preference for continuing existing lifestyles. The qualities of Ka'u that respondents felt should be preserved included its lifestyle, open space and shoreline, historic and archaeological sites, and fishing and gathering grounds. These qualities must be carefully considered during all stages of the project, if developed. Although a spaceport would predispose Ka'u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. No development would take place in sensitive habitats, and, because no other development could occur within the PCZ, the project area would be mostly open space.

As noted on page 3-24 of Volume I, the site is heavily disturbed by human activities. About 600 acres of land are planted macadamia nut orchards and about 5 acres are planted in mango orchards. In addition, about 3,800 acres are being used for grazing cattle, while plans exist for about 1,600 acres to be used for a dairy. Also, tailwaters from the sugar mill flow onto lands within the PCZ. About 6,000 acres are vacant, most of which were used in the past for cattle grazing.

Continued use of this area for agricultural purposes, particularly grazing and dairy farming, is not a guarantee that resources will be preserved. For example, there are many instances in the area in which cattle have impacted archaeological sites, either directly with the activity of hooves, or mechanical pasture improvement, such as vegetation clearing, chain-dragging and other bulldozing. It is also true that agricultural uses, generally, do not come under the permit process, so that protection of archaeological sites cannot be controlled through coordination with government agencies. The permitting process for the spaceport includes compliance with all environmental laws, including those related to archaeological sites. Mitigation procedures begin with inventory survey, and historical research, and also involve preparation, approval, and implementation of data recovery and preservation plans, as well as continued management.

As another example, during the several trips made by DBEDT's consultants to the Kamehame Hill area during field work (from 1990 to 1993), there was considerable evidence of camping on the beach in the form of tent pole structures, rubbish, and fire pits (a source of light detrimental to endangered turtles, as well as flashlights as evidenced by numerous expended dry cell batteries in the area.) With a management program in place that controls access, sensitive habitats (such as turtle nesting areas) and environmental resources (such as archaeological sites) can be better protected; protection without such a program may not be possible.

Currently site access from Highway 11 is restricted due to locked gates. Improved access to the shoreline area may actually increase the level of public use between Punalu'u and Palima Point. Closures would temporarily disrupt coastal access and use, however, the intermittent effects of shoreline closure would be limited to between 10 and 40 days per year. Implementation of the Shoreline Access Management Plan will serve to mitigate concerns from both current and future users. Losses in revenue could be offset by compensation from the launch facility operators, as is the case at Vandenberg AFB and Cape Canaveral AFB.

It should be noted that if launches were polluting the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg AFB facilities. One of the best "de-facto" wildlife preserves is right adjacent to the Canaveral launch facility. This preserve is maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. This preserve (the Merritt Island wildlife refuge) is an estuarine system with relatively low water circulation -- just the opposite of Palima Point in terms of water movement. Additionally at Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

Comment: *Ten volumes and 2,000 pages make it all but impossible for the public to digest and comment intelligently on more than a fraction of the EIS, this itself is a flaw in the system. It should in any case be clear by now that the vast majority of the people actually living on this island, and especially those in the near vicinity of Palima Point, are opposed wholeheartedly to the rocket launch facility, and that fact ought to have made this EIS entirely unneccessary in the first place.*

Response: We realize that the dEIS is lengthy, however, the EIS is based upon public concerns raised during the scoping process. The draft EIS addressed these concerns as completely as possible. For the reader's ease, the dEIS contains an executive summary that is a synopsis of the entire report. Volumes I and II highlight the information contained in the technical appendices. For those who desire further information, the technical appendices are organized by areas of study.

Agencies and the public used the review period following release of the dEIS to seek additional clarification and answers. One of the great values of the EIS process is that it provides an opportunity for citizens of the community to contribute their local knowledge and expertise to ensure the completeness of the final EIS.

The State intends to address those public and agency comments raised during this public review period. Ninety-seven agencies and individuals took the time to review the document and write to the Department--it is only common courtesy to respond to their comments. The State funded the EIS to disclose the impacts of building a spaceport. We believe the EIS serves this purpose, while recognizing that some unresolved issues may require supplemental studies to be funded by a developer. As stated in the cover letter, after completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time.

Table 1. Hydrazine Toxicity

Level mg/m^3	Level ppm	No. of times greater than REL	Toxicity
0.16	0.12	1.0	resp. irritation; minor liver toxicity
5.2	4	33	resp. and eye irritation odor threshold; minor liver toxicity
32.5	25	208	all of the above plus possible CNS toxicity, convulsions and pulmonary edema and liver damage
65	50	416	all of the above plus liver damage
104	80	666	IDLH; all of the above plus possibility of serious liver and kidney damage and death

REL for hydrazine = 0.12 ppm

Table 2. N_2O_4 Toxicity

Level mg/m^3	Level ppm	Time min	No. of times greater than REL	Toxicity
2.8	1.5	45	1.5	during exercise; increased airway resistance
1.3-3.8	0.7-2	20	0.7-2	increased airway resistance
3.0-3.8	1.6-2	15	1.6-2	increased airway resistance
5.6	3	45	3	increased airway resistance
9.4	5	15	5	increased airway resistance
7.5-9.4	4-5	15	4-5	decreased pulmonary diffusing capacity
7.5-9.4	4-5	40	4-5	increased airway resistance
13.2-32	7-17	10	7-17	increased airway resistance
11.3-75.2	6-40	5	6-40	increased airway resistance
94	50	—	50	IDLH
470	250	4.7	250	diffuse pneumonitis at 24 hr, clearing in 5 dy (astronauts)

REL for N_2O_4 = 1.0 ppm

BF/filing

P.O. Box 719
Mountain View, Hawai'i 96771
October 22, 1993

Editor, Hawai'i Tribune-Herald
P.O. Box 767
Hilo, Hawai'i 96721

There are at least four basic reasons to oppose having a spaceport in Ka'u.

In the first place, we should not waste time, energy and money on things we do not need, when there are so many things we do need. We should focus on such basic needs as food, housing, health care, improved education, and new job opportunities in diversified agriculture and its logical extension, food processing.

Second, a rocket-launching facility would pose an obvious physical danger to our relatives and friends living in the area, no matter how hard proponents of the project try to hoodwink us.

Third, also obviously, a spaceport would upset the balance of nature in that relatively unspoiled part of our island. I don't know of any responsible person, who cares about our environment, who could sincerely support the introduction of such a blight on the future of our 'aina.

Fourth, the promise by spaceport advocates of new jobs is their most compelling argument. However, like most inducements to sell our souls (our safety, our health, our 'aina) in exchange for material gain, this promise must be scrutinized carefully. We must ask ourselves, how many jobs? More important, what kinds of jobs? And then we must look at our job needs. How many residents of Ka'u are out of work? How many unemployed Ka'u residents qualify for the kinds of jobs inherent in spaceports? The "jobs" promise is nothing more than an ironic joke--on us! Sure, there will be new jobs! And there will be qualified technicians and rocket scientists imported to fill them!

[Copy to Gov. John Waihe'e]

Malie Sellers
(no phone)

12-447

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

General Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Ms. Malie Sellers
P.O. Box 719
Mountain View, HI 96771

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Sellers:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services, Dr. Richard E. Brock, and Decision Analysts Hawaii, Inc. contributed to this response.

Comment: *We should focus on food, housing, health care, education, jobs, diversified agriculture, and food processing.*

Response: Most successful economic development is based upon what people outside a community may need, rather than on what local residents may need. For the Big Island, industries which supply the needs of non-residents include tourism, sugar, macadamia nuts, coffee, papaya, flowers and foliage, astronomy, among others. In turn, Big Island residents are able to parlay the income earned from these industries into meeting their own needs for food, housing, health care, education, etc. Furthermore, many of these needs of local residents are supplied from outside a community. Such trade in goods and services generally allows a much higher standard of living than would be the case without the trade.

In the same way, commercial rocket launching in Ka`u would provide jobs and income which could be used to purchase food, housing, health care, education, etc.

With regard to jobs in diversified agriculture and food processing, employment growth is expected to occur in Ka`u (DEIS Appendix IXA). The State has been and continues to be supportive of diversified agriculture. Nevertheless, such employment growth is not expected to be sufficient to provide full employment in the District. In fact, agricultural employment in the Ka`u is expected to decline because of the closure of sugar operations.

Furthermore, while Ka`u may be a good location for macadamia nuts and some other crops, it is not the best location for many other crops. For example, the best location for supplying the large Honolulu produce market, as well as overseas markets which require frequent airfreight service, is Central Oahu where thousands of acres are being released from sugar production by Oahu Sugar Co., Ltd. Agronomic conditions are excellent (good soils, sunny conditions, gentle-sloping terrain, and ample supplies of low-cost water) and the fields are located near the large Honolulu consumer and supply markets, as well as Honolulu Airport.

Comment: *A rocket-launching facility would pose physical danger to residents of the area.*

Response: The potential effects of an accident on both human beings and the ecology are thoroughly described in the two risk assessment documents included in the dEIS (Appendices VIIIA and VIIIB) and condensed in Volumes I and II. The Health Risk Assessment concluded that the risks for normal successful launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

Comment: *A spaceport would upset the balance of nature.*

Response: As stated above, the potential risks to the environment from all activities associated with the facility have been evaluated thoroughly. It should be noted that if rocket launches were blighting the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg Air Force Base facilities in Florida and California. One of the best "de-facto" wildlife preserves is right adjacent to the Canaveral launch facility. This preserve (the Merritt Island Wildlife Refuge) maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. At Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad. It should be noted that people and agriculture--among others--also have the potential to upset the balance of nature.

Comment: *There will be no new jobs for local residents.*

Response: The outlook for job growth in Ka`u with and without a commercial rocket launching facility, and the types of the jobs which would be available to the local labor force in the District, are discussed in Appendix IXA of the DEIS.

Ka`u needs jobs for existing unemployed workers, for workers who will be laid off soon from the Ka`u Agribusiness sugar operations, for the young people who will be graduating from high school in the coming years, and for new residents who are attracted to the District due to comparatively low land and housing costs. Given the economic outlook for Ka`u, it is difficult to be optimistic regarding the prospects for full employment. This is because comparatively few activities are economically feasible in Ka`u, given its remote location, its distance from markets, and its limited support services for businesses. It is possible that new resorts may provide some jobs in Ka`u, but after many attempts over the years, significant resort development has yet to be realized there. Simply put, for most new business activities, Ka`u does not offer a comparative advantage over other places in Hawaii. In most cases, it would be more profitable for the growth to occur elsewhere.

Diversified agriculture is often mentioned as a possibility by residents throughout the State, not just by those who live in Ka`u. The best place in Hawaii for most crops, however, is Central Oahu, where some of the best farm lands are located. The area has soils that are deep with good machine tillability, the area is very sunny, and an ample supply of very low-cost water is available. Also, the fields are close to the large Honolulu consumer and supply markets, and to overseas freight terminals. Thus, for diversified agriculture, Central Oahu has a strong comparative advantage over Ka`u. Crops will indeed continue to be grown in Ka`u, but the opportunities will be limited by comparison to Central Oahu.

Tourism, agriculture, and other economic activities in Ka`u are not expected to grow sufficiently to provide the needed jobs. As summarized in DEIS Appendix IXA (pages 6-9 and 6-10), the shortfall in the number of jobs in the District by the year 2005 is estimated to be 350 jobs, assuming that spaceport is not built.

The launch facility would provide a considerable number of employment opportunities for Big Island and Ka`u residents. As discussed in Appendix IXA (pages ES-2 through ES-5, 4-1 through 4-9, 5-1 and 5-2), the launch facility would generate an estimated 690 jobs on the Big Island. Although about 230 of these jobs would be management and highly-skilled jobs filled mostly by workers from off-island, it is expected that about 460 jobs would be filled by Big Island residents, and 290 of them would be filled by residents of Ka`u.

The estimated 290 jobs for the local labor force in Ka`u would include, but would not be limited to: heavy-equipment operators, machinists, mechanics, firemen, policemen, nurses, carpenters, electricians, painters, draftsmen, purchasing agents, librarians, secretaries, assistants, bookkeepers, accountants, clerks, postal workers, hotel workers, cafeteria workers, power plant operators, sewage treatment operators, grounds-maintenance workers, janitors, and laborers. Prevailing wages in the aerospace industry for most of these workers range from $25,000 to $45,000.

Many of the workers who have been or will be released by the sugar industry have appropriate skills for jobs at the launch facility, including office workers, mill workers, heavy-equipment operators, machinists, mechanics, etc.

In the early 1970s, a number of people opposed building telescopes atop Mauna Kea. Many asserted that the telescopes would provide few jobs to Big Island residents since local residents would not be skilled enough to compete for these positions. As it has turned out, however, about half of the Big Island jobs provided by the telescope operations are filled by Hawaii residents. In addition to these direct jobs, astronomy also generates many indirect jobs that supply goods and services to the telescope organizations and their employees. Most indirect jobs are filled by local residents.

Experience has shown that, as a general rule, high-technology industries generate employment for a wide range of skill levels, not just highly skilled ones. High-technology industries also generate low- and moderate-skill jobs. This has been true of astronomy, universities, airports, hospitals, computer companies, etc. If the launch facility is built, it will also be true there.

to 051 9/9
xc: Ty.

Governor of Hawaii
c/o Office of Environmental Quality Control
220 So. King Street, Suite 400
Honolulu, HI 96813

September 7, 1993

Re: Comments to the EIS of the Proposed Rocket Launch Facility in Ka'u

Dear Sirs:

There appears to be many questions unanswered in this draft: please address the following:

1. What would be the affect of an aborted launch at the point of take off to the area of Komehame and how does your research describe this affecting the prominent nesting area of the Hawks Bill Turtle, an endangered species.

2. What would be the chemical make up of the emissions from these launches, what would the quantity be and how often, and what affect would this have upon the surrounding area, to Ka'u in general and to Kona. Has the wind direction been measured? What danger does this impose upon the vegetation, the wild life and to humanity? To the shoreline fish and the eatable seaweeds and shell life?

3. Has any account be taken as to the affect of the vibration of each launch in regard to the nesting area (which is the nearby beach) of the Hawks Bull Turtle, and also to the fragile coastline in general? Would this vibration have any effect on other wild life species, to the fish in the surrounding water?

4. We (the citizens of the Big Island) are also disturbed that this so called "space authority" is not an elected or at least represented by the people of Ka'u and the Big Island in general.

Thank you for this review, sincerely,

Linda L. Shackelford

Linda L. Shackelford PO Box 278 Paauilo, HI 96776

c.c Mr. Takeshi Yoshihara, Dept. Director, DBED

12-450

JOHN WAIHEE
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SEP. 30 1994

Ms. Linda Shackelford
P.O. Box 278
Paauilo, HI 96776

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Shackelford:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

ACTA Inc. and Decision Analysts Hawaii, Inc. contributed to the following responses.

Comment: *What would be the affect of an aborted launch at the point of take off to the area of Komehame [sic] and how does your research describe this affecting the prominent area of the hawksbill turtle, an endangered species?*

Response: The use of beaches in the general vicinity of Palima Point by nesting green and hawksbill sea turtles is described in Appendix IIIE by Dr. Richard Brock on pages 41 to 53. Dr. Brock's survey notes that the Kamehame Hill is the only beach situated in the study area. This beach is located about 1.37 km southwest of the southernmost proposed launch pad. At this distance from the launch pad the Kamehame beach area would be unlikely to be directly affected by any of the launch vehicle liquid propellants because the liquids are atomized and combusted during the abort or rain out near the pad area. Vehicle destructs which occur during ascent would tend to result in dispersal of unreacted liquid propellants as a mist transported in the downwind direction. Therefore, the primary concerns for potential impacts on the turtle nesting sites due to rocket aborts would be from burning solid propellant fragments and inert debris thrown from the destruct point as well as possible exposure of the beach and ocean surface to gaseous combustion products carried downwind from the explosion.

Figure V-3.6 of Volume I indicates that the Kamehame Hill area lies just at the edge of debris impact ellipses predicted for hypothetical Delta II launches along a southern azimuth. Using the same debris impact calculation programs applied by the Cape Canaveral and Vandenberg AFB range safety offices, ACTA computed the amount of solid propellant expected to reach the ground at various abort times. The results for Delta II vehicles, which carry the most propellant and therefore offer the highest potential risk, indicate that destruct actions at 15, 25, and 35 seconds into flight are expected to have 22 percent, 7 percent, and 2 percent of the original solid propellant mass impact the ground respectively. The rest of the mass is consumed by combustion either before the rocket is destroyed or by burning during free fall back to the ground. The debris "footprints" shown in Figure V-3.6 indicate that by 40 seconds into flight the debris patterns are falling over open ocean. Easterly launches, as shown in Figure V-3.4, indicate that the debris patterns could affect the costal zone toward the Volcanoes National Park. Burning solid propellant would not be expected to reach the ground after about 50 seconds into flight.

The foregoing discussion can be summarized by stating that there is a small likelihood that the Kamehame hill and beach area could be impacted by falling chunks of solid propellant during a rocket abort, especially if the abort occurred in the first 25 seconds or so of flight. The consequences of such an abort on sea turtles is speculative. The probability of a direct

fragment impact on Kamehame beach is extremely remote due to the distance of the beach from the centroid of debris impact patterns and the small size of the beach.

At the mainland ranges, which have been operational for many years, there are well defined safety corridors bounded by what are called destruct limit lines. During a launch the projected debris impact positions are monitored and if the projected debris pattern crosses the destruct limit line from the safe corridor into the unsafe area, the missile flight control officer destroys the launch vehicle. The guidance systems of correctly functioning rockets are able to carefully steer the vehicle along a preprogrammed trajectory and the destruct limit lines are only violated if there is a launch vehicle failure which causes the rocket to lose steering control. The destruct limit lines which might be applied to a Palima Point launch facility have not yet been defined but would be by the time actual launches commenced. Protection of public health and property are prime considerations in defining the destruct limit lines. Protection of critical turtle nesting areas could also be a consideration when selecting appropriate destruct limit lines.

Day of launch forecasted wind patterns are used to predict the debris patterns during actual launch operations. Most of the solid propellant fragments are expected to be fairly large and compact giving them a high ballistic coefficient. Fragments with high ballistic coefficients are quite insensitive to the prevailing wind conditions, hence their impact locations are governed by the velocity and position of the launch vehicle at the time of vehicle destruct plus the additional random velocity imparted by the vehicle explosion. These factors are all taken into account when computing the debris impact patterns. The science of range safety has evolved to the point that the debris analysis and missile destruct safety systems afford a high probability of maintaining safe operations and the general public should not feel that they are at the mercy of errant rockets. The issues to be resolved in operating the spaceport are not so much whether or not safety margins can be achieved but rather what level of constraint should be imposed on launch vehicle customers operating from the spaceport.

In the event that a solid propellant fragment did impact the beach the likely results would be: cratering at the immediate impact point, ejection of secondary propellant fragments, consumption of the propellant in a matter of seconds to minutes by vigorous burning (somewhat like a highway flare) with possible residual aluminum oxide slag and possible glassification of the surface of the sand. The primary combustion products from burning solid propellant are as follows:

carbon dioxide	(CO_2)	approximately 24% by mass
aluminum oxide	(Al_2O_3)	approximately 34% by mass
hydrogen chloride	(HCl)	approximately 21% by mass
nitrogen	(N_2)	approximately 9% by mass
water	(H_2O)	approximately 11% by mass

Of these constituents, hydrogen chloride and small aluminum oxide particulates are potentially hazardous if inhaled by humans or animals. The physiological impact of these chemicals on reptilian species and sea turtles in specific is addressed in Appendix VIIIB page 5-10 where it is concluded that *"...it is unlikely that exposure by inhalation would result in adverse effects due to turtle respiratory physiology."* It should be noted, however, that this section of the risk assessment to ecological receptors was addressing the consequence of possible exposure of turtles to the transient gas cloud that could pass over the area from burning propellant near the pad area rather than from a solid propellant fragment burning on or near the Kamehame beach area. Again the likelihood of a propellant fragment hitting the beach while a turtle is actually on the beach nesting is extremely small.

Perhaps a greater concern is whether or not there is any long term hazard associated with the possible impact of rocket fragments on beach area. Appendix VIIIB, Table 3-1 indicates that, with the exception of aluminum oxide, the propellant products are short lived in the environment. None of the chemical species are expected to pose a hazard once the immediate inhalation hazard has passed. A secondary impact to the turtle nesting areas could be the ignition of a brush/grass fire on the slopes above the beach. Hawksbill turtles apparently favor nesting beneath overhanging brush. It is not clear whether the Kamehame beach is bordered by vegetation or if the beach ends at a rocky zone. Brock documented nest pits under a cavelike rocky overhang at Kamehame beach which appeared to be a favored nesting site (Appendix IIIE, page 44).

Propellant landing in the water or dispersing as a gas over water is estimated to be significantly diluted by the wave surge action and relatively deep waters off Palima Point. Burning solid propellant may be quenched by immersion, in which case the fragment would be composed of relatively inert aluminum, polybutadiene binder, and ammonium perchlorate. The latter may dissolve in sea water. Should burning persist in water, the HCl gas would form hydrochloric acid which would then be diffused into the surrounding waters. It is deemed unlikely that sufficient HCl could be released before thoroughly mixing with sea water to measurably lower the pH of the water.

ACTA concludes that there is a small potential for adverse impact on sea turtle nesting in the Kamehame Hill area and potentially other sites up the coast toward the Volcanoes National Park. With a management program in place that controls access, however, sensitive turtle nesting areas can be better protected, whereas currently protection is virtually nonexistent. For example, during the several trips made by DBEDT's consultants to the Kamehame Hill area during field work (from 1990 to 1993), there was considerable evidence of camping on the beach in the form of tent pole structures, rubbish, and fire pits (a source of light detrimental to endangered turtles, as well as flashlights as evidenced by numerous expended dry cell batteries in the area.) Therefore, if access to beach and coastal areas frequented by turtles is controlled by the spaceport operation, then other adverse human

impacts on the turtles (such as poaching, fishing, and beach use) may be reduced--resulting in a net improvement to wildlife.

The Merritt Island Wildlife Refuge on Florida's Kennedy Space Center offers some of the best birding along the Florida coast because residential and commercial land use has been restricted and the marsh habitat preserved. Likewise a successful nesting colony of endangered least terns exists at Vandenberg AFB within a few thousand feet of the SLC-2W Delta launch Pad. During the nesting season, launches are suspended, but during the remainder of the year the birds and habitat are protected and preserved by virtue of Air Force stewardship and restriction of general public access.

Mitigation of impacts to Kamehame beach could consist of the following:

- Restriction of night launches during active nesting periods of hawksbill and green sea turtles. (This could require support from Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) to conduct field surveys to identify and document nesting periods.) Night launches would also be restricted due to astronomy concerns.

- Subdued lighting at the launch pad facilities and possible erection of light barriers at the Kamehame beach area to minimize the impact of night lighting on adult turtles making their nesting runs and on hatchlings orienting toward the surf.

- Survey of the beach nesting area following any launch aborts to search for and remove any rocket debris and to fill, with hand tools, any debris craters.

- Restrict launch azimuths and hold launches during unfavorable wind patterns for debris and/or toxic hazards are forecasted to impact active turtle nesting areas.

Range safety operations of a Palima Point spaceport would require that a prelaunch safety analysis examining debris and toxic hazards will be conducted prior to every launch (as is currently done at ranges on the mainland). The use of time of launch forecasted weather conditions for each specific launch vehicle provides the launch operator with the best available safety assessment and the ability to hold launches until conditions are favorable. Although the specific launch vehicle and weather scenarios would have to be examined on a case by case basis, it is quite likely that the Kamehame Hill and beach area would often be protected from toxic gas exposures because this area lies in a line between the launch facility and Punaluu. Any wind pattern which was predicted to pass a hazardous launch exhaust cloud over the Kamehame hill area would probably also hazard the Punaluu area and impose a potential human health hazard which would automatically result in a launch hold until winds shifted to place the plume travel in a safe direction.

Comment: *What would be the chemical makeup of the emissions from these launches, what would be the quantity, and how often? What effect would this have upon the surrounding area, to Ka'u and to Kona. Has the wind direction been measured? What danger does this impose upon the vegetation, the wild life, and to humanity? To the shoreline fish and the edible seaweeds and shell life?*

Response: The potential effects of launches are described in Volume VIII and condensed in Volumes I and II. Wind measurements and methodology are described in Chapter 5 of Volume I.

The Ecological Risk Assessment concludes that the actual risks to ecosystems from all activities associated with the facility is quite low. This should not be surprising when one considers that rocket launches have been taking place on Kauai and on the mainland (and at one time, South Point on Hawaii) for over 30 years.

The Health Risk Assessment (HRA) concludes that the risks for normal successful launches and abnormal launch failures are negligible. The only health risks that were found to be significant were from on and off-site accidental spills which are not immediately remediated.

Comment: *Has any account been taken as to the affect of the vibration of each launch in regard to the nesting area (which is the nearby beach) of the Hawks Bull Turtle, and also to the fragile coastline in general? Would this vibration have any effect on other wild life species. To the fish in the surrounding water?*

Response: The launch vehicles discussed in the dEIS (Delta II and Atlas IIAS) are the same size or smaller than those launched from Cape Canaveral and Kennedy Space Center (Space Shuttle, Titan IV, Delta II and Atlas IIAS). The region adjoining the Kennedy Space Center is a wildlife refuge and the area is growing with birds and other wildlife rather than abating. There is no report of a decrease in any species.

The energy from sound generated in air is primarily reflected back into the air because of the large difference in the acoustic impedance of air and water. Therefore, the subsurface sound is not as large as one might expect. Drawing from launch experience at Cape Canaveral and the Kennedy Space Center, there is little evidence that fish have been affected at all by the brief acoustic environment of a launch. There is no evidence of dead fish or of fish moving out of the area due to noise impacts.

It should be noted that there are numerous examples of where vibration and noise are emitted into the nearshore marine environment with no discernible impact on marine species.

The first example that comes to mind are earthquakes which may be severe; these have occurred from time immemorial and turtles continue to utilize Kamehame Hill beach for nesting activities. An example of a manmade noise source is at Keahole Point where the pumps for the 12-inch and 18-inch seawater pipes are emitting a loud sound almost continuously underwater. DBEDT's consultant, Dr. Richard Brock, has monitored fish and coral communities at Keahole Point since 1987 and has seen no discernible impact due to the noise. Similarly, underwater construction or just the operation of certain vessels all create relatively high noise levels and studies have not found an impact on sea turtles due to noise or vibration.

A case in point is the construction of four swimming lagoons at West Beach (Ko'Olina), Ewa, Oahu that occurred in 1989-1990. In that case, a large number (about 30) Green sea turtles were located in a resting habitat about 1km from shore fronting the project site. The National Marine Fisheries Service was concerned that the construction of these lagoons along the shoreline using dynamite and heavy machinery (including a specially built bulldozer that worked via remote control underwater) would have a negative impact on the green turtle resting and foraging areas. The situation was monitored with NMFS personnel through the entire project. What occurred was totally unexpected -- within two weeks from the commencement of lagoon construction, all but three turtles moved from the offshore resting area to a point about 200m seaward and directly offshore of the actual construction site. None of the scientists involved in this study were able to explain why the turtles moved into close proximity of the construction work. Apparently the noise (including dynamiting) did not disturb the turtles in this case.

Comment: *We are also disturbed that this so-called "space authority" is not an elected or at least represented by the people of Ka'u and the Big Island in general."*

Response: The State Spaceport Management Plan, Appendix XE, lists the principal participants involved in developing and operating the launch facility. Among them are the Authority and a Citizens' Advisory Committee. The Citizen's Advisory Committee, which would have direct access to the Authority would (1) advise the Executive Director of the launch facility and the Board of Directors of the Authority on the attitudes, observations and concerns of the citizens of the Big Island regarding the launch facility in order to resolve potential problems; and (2) inform local Big Island residents about the facility and elicit support for it within the community. The role of the Authority would be to represent the interests of the State (and, by implication, the citizens of the State).

There are a number of State Authorities in Hawaii, such as the Natural Energy Laboratory of Hawaii Authority (NELHA) and the High Technology Development Corporation Authority. The primary role of any State Authority is to further economic

development, since State Authorities are established to respond more quickly and flexibly than can other government agencies.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: C Gregory Shropshire Date: 11/22/93

Name and address:
Charles Gregory Shropshire
P.O. Box 15345
Hilo, HI 96721

Cc:_ Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

-State of Hawaii, Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

12-455

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Centre Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Mr. Charles G. Shropshire
P.O. Box 15345
Hilo, HI 96721

Dear Mr. Shropshire:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

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> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS

Sincerely,

Takeshi Yoshihara

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: (AS) Date: 11/9/93

Name and address: Anna Sierpinske
Grospieper 5
3738 SB Maartensdijk
The Netherlands (Europe)

Cc: -Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

-State of Hawaii, Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

P.S. I'm very disappointed hearing about your plans. I love this island. I've been the fifth time already. I'm afraid your plans will stop the tourist-movement on the island. Another drastic (!) consequence are known to everybody! I hope you'll respect people's opinion. (AS)

12-457

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2408 Fax (808) 586-2377

Ms. Anna Sierpinske
Grospieper 5
3738 SB Maartensdijk
The Netherlands, Europe

SEP. 30 1994

Dear Ms. Sierpinske:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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SEP. 30 1994

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-458

Lanny Alan Sinkin
P. O. Box 14278
Portland, Oregon
Cascadia Bioregion 97214
(503) 231-9694

November 22, 1993

Governor, State of Hawai'i
c/c Office of Environmental Quality Control
220 South King Street
Honolulu, Hawai'i 96813

Re: Conceptual Plan for a Commercial Satellite Launching Facility at Palima Point - Comments

The attached pages are submitted as comments on the above-referenced project. I ask that they be included in the DEIS process. Thank you for your attention to this matter.

Lanny Sinkin

Enc.

12-459

COMMENTS ON
CONCEPTUAL PLAN FOR A
COMMERCIAL SATELLITE LAUNCHING FACILITY
AT PALIMA POINT

In thirty years of public interest work, I have seen many amazing things.

In Texas, I saw a nuclear power plant placed where more hurricanes make landfall than any other site. I also saw developers in San Antonio subsidized to put in subdivisions on the rock outcrops where the city's aquifer -- sole source of drinking water for more than one million people -- is recharged by rainfall.

In Washington, D.C., I got a close look at the Iran-contra scandal, where operations sanctioned by the United States government included narcotics smuggling to fund covert operations. I also saw fifty pounds of plutonium placed on a shuttle to be launched in Florida and to be flown back past the Earth twice for gravitational acceleration, despite the possibility of an inadvertent reentry releasing 240,000 curies of radiation into our atmosphere.

But if I thought I had seen the best of human folly, I was wrong. In early November, I appeared to testify in a public hearing before a subcommittee of the County Council of Hawaii. The subject was a proposed satellite launching facility to be located at Palima Point on the island of Hawaii.

As I listened to the Council members and citizens question those who participated in the preparation of the Draft Environmental Impact Statement (DEIS), I was struck by the absolute irrationality of this project.

In his testimony, Harry Kim, Director of Civil Defense for Hawaii County said, "When I stated in Waikiki that I could not find or very few places on the islands. I should have said on the entire world that are more hazardous in regard to subsidence, earthquakes, hurricanes, and eruptions than this particular site."

Kim noted that practically all of the cyclones that strike the island come in on the southeast side where the proposed launch site is located.

Noting that the site would contain chemicals classified as extremely hazardous, Kim warned of an accident that would result in the area being "condemned for pollution for life, for the life of the land."

Kim went on to eloquently portray the difficulties he would have, if there were a natural disaster requiring a civil defense response to damaged communities that also required a response to extremely toxic materials being released at the proposed facility.

Other participants in the hearing testified that an earthquake would shear the ground at the site, causing parts to drop from three to ten feet. Under such circumstances, every structure at the site, including storage tanks for toxic chemicals, would be destroyed.

Witnesses also testified that the assumption that the site could somehow be protected against lava flow was nonsense. Prior attempts to create "lava diverters" have proven useless in the face of an actual lava flow.

Among the other issues raised were the threat to the

numerous endangered species and threatened species in the unique and fragile ecosystems of this island. The sound, light, and chemical pollution from launches; the threat of spills or other accidental releases; and the possibility of releases caused by natural disasters create a tremendous potential for damage to these ecosystems and the species dependent on them.

A National Parks Service witness testified that the proposed launch facility represented a threat to the Hawaii Volcanoes National Park. He noted that the United States had signed a United Nations treaty agreeing to protect this park as a world heritage site but that no effort had been made to notify the United Nations of the project or to protect the site as the treaty required.

In our democracy, everyone is free to propose any damn fool idea they can think up. But the idea of a launch facility at Palima Point has already led to the expenditure of millions of public dollars on a proposal that never deserved to get past the idea stage.

The environmental impact assessment could lead to cancellation of this project. But I am not optimistic that such a rational decision will be reached. After all, the nuclear plant was built in Texas, the developers are still building in San Antonio's aquifer recharge region, Oliver North is running for Senate in Virginia, and plutonium is still being launched by NASA. Perhaps the Governor of Hawai'i will show more wisdom than is being shown in other areas of our society by cancelling the proposed satellite launching facility and any further work on the environmental impact statement. I urge such a decision as being common sense and in the best interest of the people of Hawai'i.

Lanny Sinkin
P. O. Box 14278
Portland, Oregon 97214
(503) 231-9694

✓c.c. Department of Business, Economic Development & Tourism
Attn.: Mr. Tak Yoshihara, Deputy Director
P. O. Box 2359
Honolulu, Hawai'i 96804

12-460

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
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SEP. 30 1994

Mr. Lanny Sinkin
P.O. Box 14278
Portland, OR 97214

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Sinkin:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

KRP Information Services, Richard E. Brock, Ph.D. and Risk Science Associates contributed to the following responses.

Comment: *The site is susceptible to subsidence, earthquakes, hurricanes and volcanic eruptions. These could result in the release of toxic chemicals and cause extreme damage to humans and the environment.*

Response: It is stated in Volume I of the DEIS that *"Rocket propellants stored at the proposed launch facility pose a hazard to people and the environment in the event that an earthquake causes a failure of containment. The three principal consequences of propellant releases are leaks or spills, fires and explosions. Any one of the three may result in the other two."* The liquid propellants are very flammable and would most likely burn if released in a natural disaster. The ignited liquid propellants do not pose a toxic hazard, rather, the thermal energy from resulting fire or explosion would pose the greatest concern. As stated in Volume I, Chapter Five of the DEIS:

> *"Palima Point is located in a hazardous geologic area. Because of the frequency of earthquakes on the Big Island there is a potential for an earthquake to occur while a fully fueled rocket is on the launch pad. The possibility exists for the vehicle to topple over during a very strong earthquake. If this happens the liquid propellants will most likely ignite and the rocket will be consumed. The effects will be similar to the on-pad launch failure assessed in Volume I, Chapter Five of the dEIS."*

Given the propensity for earthquakes in the project area, the following should be incorporated into the launch facility design. See Appendix IIIA for a discussion of the following mitigations.

* Facility layouts should consider the effects of potential earthquakes.
* All facilities on the launch site should be designed to UBC 4 standards. Strict quality control procedures should be employed during all phases of construction.
* The design of safety equipment should insure that the most stringent protective measures are constructed. This equipment should be continually maintained during the operation of the facility. Personnel should be trained in the maintenance of fire suppression and other safety equipment.
* Emergency procedures must be planned before completion and operation of the facility so that personnel can be trained and appropriate documentation of the procedures can be delivered to the facility and government (state and local) agencies for perusal and preparedness.

The potential effects of spills that do not burn (cold spills) are presented in Volume I, Chapter Five of the DEIS. Toxic releases from spills of liquid propellants on the launch facility site are evaluated on page 5-127. In the analysis it is assumed

that the entire contents of a storage vessel is released under worst case meteorological conditions (615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide) and that the spilled liquid is allowed to remain and evaporate over time with no effort made at remediation. The resulting cancer risk due to a hydrazine release under this accidental scenario (which is highly unlikely but could conceivably occur as a result of a natural disaster such as an earthquake) is 9.5×10^{-4}. The maximum acute hazard index is 10.6 at Pahala. Thus, *"the individual cancer risk from just one on-site spill is significant. Acute and chronic adverse health effects in the surrounding community will also occur under unfavorable wind conditions from just one on-site spill."*

The risk analyses do not account for the mitigating measures that will be in place in the event of a natural disaster and the fact that remediation would be swift for such emergencies and procedures would be in place to minimize adverse effects.

In respect to potential lava inundation, if an eruption were known to be imminent, or underway, some portable/hazardous items and sensitive payloads could be removed before being overrun by lava. Such eruption prediction or forecasting has been successfully implemented by monitoring magma movements using seismicity data (and listening for volcanic tremor, etc.). More significantly, lava inundation of the entire Palima Point launch facilities would effect a complete permanent shut-down of the operation. Detailed contingency plans for such a shut-down will be adopted and regular drills will be conducted to ensure that all potentially hazardous facilities will be secured in such a manner their destruction will not present a threat to humans or sensitive species. Such procedures are required to be in place for facilities handling toxic materials.

The statement about diverters in the dEIS has been misquoted. Volume I, Chapter Four, states:

> *"The only mitigating measure is to build lava diversion structures around the launch pads. If the lower SWRZ of Kilauea should erupt, however, the launch pads would likely be inundated and destroyed. Lava diversion techniques would only be a temporary solution. For example, east rift zone eruptions of Kilauea in 1960 breached diversion barriers, and eventually buried most of the town of Kapoho."*

We agree that the DEIS does not discuss the effects of severe wind storms on facilities. The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community.

Structures can be sited, engineered and designed to satisfy these needs. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms. Because of the high capital investment required to develop a launch facility, it is certain that all structures will be engineered to sustain maximum design winds.

The costs of designing for severe storms will be a factor the launch site developer will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is realized, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge. Some of the design and operational issues pertaining to tropical storm threats that need to be considered by a developer/operator are:

* Is there sufficient time at the first notice of a potential storm to protect a vehicle that is scheduled for launch and may be partially built-up?

* Can hazardous materials such as liquid propellants be stored in such a way as to survive a storm without the storage vessel being breached and allowing a potentially dangerous spill?

* How will solid rocket motors be protected during a storm?

It should be noted that the ability to secure hazardous materials during a severe storm was recently successfully tested at Johnston Island during hurricane John.

Ground subsidence is discussed in Appendix IIIA of the dEIS under geologic hazards and earthquakes. This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Plate 2). As stated on page 13 of the appendix:

> *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment included in Appendix A (page 2, paragraph 2) notes:

> *"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up."*

The ACTA report continues (page 2, paragraph 3):

> *"...regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka`u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."*

Additional data regarding ground subsidence and cracking is presented in the ACTA report describing specific historical events such as the 2 April, 1868 and 29 November, 1975 earthquakes (page 3). Furthermore, the ACTA report discusses the earthquake-induced ground failures (section 2, pages 4-6) including "extension and contraction failures (cracks)" and "coastal inundation resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are specifically addressed in the ACTA Seismic Risk Assessment for the three "design" earthquakes (on pages 6-9) under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS (Appendix IIIA, p. 18) recommends *"siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report"*. More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in Appendix IIIA of the dEIS. Specific mitigations mentioned include:

* locate hazardous facilities away from known geologic hazards; and

* carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."

The potential effects of toxic releases from accidents (including natural disasters) on both human beings and the ecology are thoroughly described in the two risk assessment documents included in the dEIS as Appendices VIIIA and VIIIB and condensed in Volumes I and II. The Health Risk Assessment concluded that the risks for normal successful launches and abnormal launch failures were negligible. As noted above, health risks from on and off site accidental spills which are not immediately remediated could be significant. It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

It should be emphasized that the effects of subsidence, a volcanic eruption, an earthquake and/or a hurricane of sufficient magnitude to destroy the spaceport and release the entire contents of the fuel storage facilities would be so great that the presence of hydrazine or other rocket fuels would be the least of Kau's worries.

Comment: *Threats to endangered and threatened species.*

Response: The actual risks to the ecosystems from all activities associated with the facility is actually quite low. Potential adverse impacts from sound, light and chemical pollution from launches, the threat of spills or other accidental releases and

the possibility of releases caused by natural disaster are all addressed within the ten volumes of the dEIS, specifically the following:

Volume I:

Chapter Three which describes the environmental setting of the proposed project;

Chapter Four assesses impacts from natural hazards, construction activities and routine launch facility operations; and,

Chapter Five, which discloses potential impacts from launch operations, transportation accidents and chemical spills, is organized by major groups of actions related to the following project elements: transportation of propellants and gases; launch events, including: normal launches and launch failures; hazardous operations including: propellant storage and handling, payload processing and accidental spills; and, special concerns, which includes analyses of project effects on the Mauna Kea and Mauna Loa Observatories and global and regional air quality.

Volume II:

Chapter Seven, which discusses sociocultural and recreation issues (including Hawaii Volcanoes National Park), and visual impacts;

Chapter Eight, which evaluates the cumulative effects of the proposed action and presents a summary of adverse impacts; the relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity; and, irreversible and irretrievable commitment of resources; and unresolved issues.

Technical Appendices:

Volume III, the Natural Environment, includes reports on geologic hazards; groundwater resources; botanical resources; birds and mammals; marine, anchialine and sea turtle resources; and, nearshore water quality.

Volume V, Facilities Construction and Use, includes reports on traffic; climate and air quality; drainage and flooding; and, construction impacts.

Volume VI, Launch Operations and Hazards (1), includes a hazard analysis for the transportation of propellants from Hilo to the site; accident risk assessments for handling and storage and payload processing facilities; and, an impact analysis of toxic spills, exhaust gases, and vehicles accident gases.

Volume VII, Launch Operations and Hazards (2), includes reports on debris dispersion effects from an aborted launch; acoustical noise impact evaluations; a survey of potential sonic boom consequences; and, explosive overpressure hazards.

Volume VIII, Human Health and Ecological Risk Assessments of toxic effects including: spills during transportation of propellants, normal launches launch failures and accidental spills.

It should be noted that if rocket launches were a threat to the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg Air Force Base facilities in Florida and California. One of the best de facto wildlife preserves is right adjacent to the Canaveral launch facility. This preserve (the Merritt Island wildlife refuge) maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. At Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad.

Comment: *No effort has been made to notify the United Nations of the project.*

Response: At the present time, there is no threat to a World Heritage Site as there is no project. Should a specific project be proposed, appropriate federal agencies--those that have the authority to speak for the "host country"--would notify the United Nations. These agencies would then be provided, at their request, with all of the information developed during the EIS process.

Comment: *The project does not deserve further consideration.*

Response: Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

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I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Carrie Smith Date: 11/19/93

Name and address: CARRIE SMITH
140 N. Kalaheo Ave.
Kailua, HI.
96734

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
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State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-464

JOHN WAIHEE
GOVERNOR
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SEP. 30 1994

Ms. Carrie Smith
140 N. Kalaheo
Kailua, HI 96734

Dear Ms. Smith:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

2100 Date St. #2403 (my address)
Honolulu, HI 96826

November 17, 1993

(Department of Business & Economic Development)
(Office of Space Industry)

To whom it may concern:

Thank you for sending me Vol. I & II of the Environmental Impact Statement.

After reading these volumes and following through with the media, it still seems to appear that the majority of the people of Ka'u are against the spaceport. There is nothing but opposition for this entire project. There is your answer right there! Why pursue it any further!

You have stated in your reply letter to me dated July 9, 1993 that the DEIS "purpose is to assist the decision-makers, which includes the community, to make the decision on whether the project will or will not be built." Please always remember that!!

The main concern should be focused on the feelings of the people of the Ka'u community after all, it is "their place." Who is to say or even have the right to tell them what is best for them, for only they know the answer. What if the shoe was on the other foot? I am sure that you would feel the same way.

Thanks for reading my comments and for giving me the opportunity to do so once again.

Please keep me informed about this matter. I would appreciate it very much. Thank you & God Bless,

Mary Lou Sumida

12-466

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGER
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu, Hawaii 96813
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SEP. 30 1994

Ms. Mary Lou Sumida
2100 Date St. #2403
Honolulu, HI 96826

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Sumida:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

POSTED 16 1993

DECLARATION BY:
William Frederick Hachmeister
P.O. Box 10267
Hilo, Hawai'i 96720

'93 OCT 18 P3:00

IMPORTANT PUBLIC NOTICE CONCERNING THE SPACEPORT PROPOSAL

"HE WHO IS SILENT IS CONSIDERED AS ASSENTING, WHEN HIS INTEREST IS AT STAKE": the Palima Point spaceport proposal is currently being offered for review to the public. This is your ONLY chance to state your concerns in writing.

LEAVING THE PUBLIC WITHOUT RECOURSE: rule of public disclosure concerning nuclear fueled rockets does not apply to the State draft environment impact statement, since State of Hawai'i's law, Act 172, already prohibits nuclear fuels on launch vehicles. On the contrary the Federal Government does not have to comply with Hawai'i State law. Any Federal agency can use nuclear fuels on rockets or space-probes at any future date. Further, the State does not have an instrument of contract concerning the spaceport operation, launch restraints and constraints, and liabilities. Only a letter of intent from Lockheed Corporation.

NEWLY DEVELOPED "STATE OF THE ART" NUCLEAR PROPULSION (THERMIONIC) ROCKETS: nuclear propulsion rockets do exist! Thermionic performance is by far greater then that of chemical rockets that are contentiously fading into history. Thermionics provide speed and payload lift abilities that are considered important for the planetary expeditions, and are being adapted to the Ballistic Missile Defense projects. QUIETLY purchased from Russia by our government in 1991, the Bush Administration intentionally limited the public's awareness of the purchase, as reported by The Washington Post, Aviation Week and Space Technology, Christian Science Monitor, and The Wall Street Journal.

IRREPARABLE HAZARDS OF NUCLEAR FUELED ROCKETS: a thermionic rocket is capable of vaporizing and releasing considerable amounts of lethal nuclear fuels, or exploding with a force many times greater than that of Hiroshima. A single malfunction could leave the Island of Hawai'i, probably all the Hawaiian Islands uninhabitable for thousands of years. Nuclear rockets carry hundreds of pounds of PLUTONIUM or URANIUM, whereas the bomb that destroyed Hiroshima required only 2.2 pounds of plutonium, in the historical single event that ended world war II, and continues to be a major health hazard to this day.

ETHICAL VIOLATIONS INVOLVING NASA AND NUCLEAR FUELED SPACE-PROBES: "Sometimes it takes a cowboy". in 1989 I enjoined the Christic Institute's litigation to halt the launch of the NASA space shuttle Atlantis that was carrying the nuclear fueled space-probe Galileo. I gave expert testimony that my ex-employer Teledyne had provided faulty flight computers critical to the shuttle system. The Pentagon and Department of Justice had received guilty pleas, and trial convictions of Teledyne procurement executives. Therefore, significant proof was available to the judge hearing our litigation that should have ruled in our favor and halted the NASA mission. However, our motion was denied and the Launch continued. The following year the nuclear fueled space-probe Ulysses went through a similar challenge, and that litigation also failed. Twice the people of Florida were without recourse except to live in fear of a failed launch that was capable of a single event mass destruction greater than that of Hiroshima. Since 1989 Teledyne Relay's has pleaded guilty, fined, and banned from Pentagon contracts.

THE AMERICAN LAW: Qui tacet consentire videtur, ubi tractatur ejus commodo; "He who is silent is considered as assenting, when his interest is at stake".

BEFORE THE SPACEPORT PROPOSAL CAN BE STOPPED A MAJORITY OF THE PUBLIC MUST REACT NEGATIVELY IN WRITING. SEIZE THIS EXTREMELY VALUABLE OPPORTUNITY TO REPLY. DEMAND THE TRUTH AND ANSWERS TO THESE EXTREMELY CRITICAL QUESTIONS.

NEGATIVE LAND VALUES (Land Economics Feb. 1991 v67 n1 p30(7)): Hawai'i must not apply for a spaceport license from the United States Department of Transportation. Once the license is granted, we are without recourse in matters of nuclear material storage and usage. Economic researchers have found that a significant negative effect occurs on the financial value of agricultural land in the proximity of nuclear reactors (foot note (1)). I agree with members of the Hawai'i County Council and their deferring RESOLUTION 102 93 that demands the State withdraw the spaceport proposal.

THE CHOICE IS YOURS: the State of Hawai'i refuses to address these critical nuclear issues, by simply referring these issues to the Federal Environmental Impact Statement which occurs after the issuance of the license. Therefore, we the people have only one opportunity to make our feelings known. Inform your family and friends; respond to this public notice. Your written statement (optional) is also important for decision makers. Respond by mail to me or to:

Office of Environmental Quality Control, 220 South King Street, Suite 400, Honolulu, Hawaii, 96813.

My signature supports and demands the withdrawal of the spaceport proposal:

NAME	SOCIAL SECURITY	ADDRESS	TELEPHONE
Warren K Sumner	531-36-1678	78-7190 Kaleiopapa Rd Apt 2 Kailua-Kona HI 96740	324-7603
		SIGNATURE Warren K Sumner	
Sharon L Sumner	532-40-2069	78-7190 Kaleiopapa Rd Apt 2 Kailua-Kona HI 96740	324-7603
		SIGNATURE Sharon L Sumner	
		SIGNATURE	

TIME IS OF THE ESSENCE: carefully consider the facts, and discuss these issues with your family and friends. If you feel the same as I and others do then your reply must be mailed immediately. Further, I suggest you xerox this form for others to respond. We must have the majority of the population to make a difference.

Mahalo Nui Loa,

William F. Hachmeister

William Frederick Hachmeister
(ex System Sustain Engineer for Teledyne MicroElectronics on the NASA space shuttle and unmanned launch vehicles).

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Warren and Sharon Sumner
8-7190 Kaleiopapa Rd.
Apt. 2
Kailua-Kona, HI 96740

Dear Warren and Sharon Sumner:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

187-C Hokulani St.
Hilo HI 96720

November 16, 1993

Mr. Mufi Hannemann, Director
Department of Business, Economic Development, and Tourism
P.O. Box 2359
Honolulu, Hawai`i 96804

Subject: Comments on Draft Environmental Impact Statement for a Space Launch Facility at Palima Point, Ka`u, Hawai`i

Dear Mr. Hannemann:

I respectfully submit the following comments on the Draft EIS mentioned above.

In general, I would fault the EIS for using inconsistent assumptions. The document relies on the work of a number of subconsultants who do not always employ the same assumptions about the operation of the proposed facility in preparation of their respective reports. This results in a document that leaves the reader perplexed as to which projections are more accurate and which to believe. I cite below several examples, relating to the calculation of health risks:

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a. **Launch frequency, failure predictions and calculated health risks**

In Volume 8, Appendix A ("Human Health Risk Assessment"), page 6-2, the statement is made: "In this assessment it is assumed that one conflagration event occurs per 70-year lifetime and that total dispersion of emitted substances occurs within one hour." On the next page, the study states that it assumes an identical frequency rate and dispersion model for deflagration events. On the basis of these assumptions, hazard and cancer risk analyses are conducted for the populations presumed to be exposed to chemicals released during these events.

Volume 6, Appendix D ("Impacts of Toxic Spills, Exhaust Gases and Vehicle Accident Gases"), page 4-24, provides a discussion of the history of launch failures for Atlas and Delta vehicles. There it is stated, "Assuming 5 or 6 launches per year from the proposed Hawaiian spaceport, it would not be unreasonable to expect several conflagration type vehicle failures over a 15-year period." (This assumed launch rate is in keeping with launch rate statements elsewhere in the DEIS.)

I question, then, the basis for the statement in the health risk assessment that just one conflagration and one deflagration are expected in a 70-year period. I suggest that the health risk

assessment must be redone so that the predicted health effects are more in keeping with the projected launch failure rates.

Second, I would suggest that the impact study be revised to include some discussion of the deflagration frequencies and predicted occurrences at the space launch facility. Otherwise, there is no basis for the one-in-70-years assumption for the deflagration frequency rate.

b. **Accidental spill scenarios**

I refer again to Volume 8, Appendix A ("Human Health Risk Assessment"). The calculations of health risks are based upon assumptions that do not agree with the set of assumptions used in the study on which the risk assessment is based -- that is, Volume VI, Appendix A ("Risk Analysis for the Transportation of Propellants from Hilo to Palima Point").

In the frontispiece to the risk assessment, there is an acknowledgement that adjustments have been made in the case of two of the assumptions (that dealing with pool depth and the number of containers of hypergolic fuel that would be ruptured in a spill). (Readers are informed that "the analysis is not affected by these changes." I would be more confident if the study were revised so that the changes in assumptions would be contained in the report itself, rather than merely in a prefatory comment.)

There is, however, another area of disagreement between the risk assessment and the risk analysis on which it is based. This concerns the duration of the spill. On page 6-5 of the health risk assessment, the report states that "a pool blanketing time of 15 minutes" was assumed.

Preparers of the ACTA report were instructed to "select events that will produce the highest risk and community impact." In keeping with this, it provided scenarios that were based on a 30-minute blanketing time "for all container spills." "In addition, the risk assessment states, "a pool blanketing time of 15 minutes was used to determine the concentration levels associated with accidental spills of a 55-gallon N_2O_4 container" -- I believe this is a mistake, and it should read: N_2H_4 -- "and a 300-gallon N_2O_4 cylinder." As further indicated in accompanying tables indicating 60-minute mean concentrations associated with the various spill scenarios, the 15-minute spill scenario is clearly *not* the one that produces "the highest risk and community impact."

On what basis, therefore, does the health risk assessment choose to base its calculations on the 15-minute spill scenario as opposed to the 30-minute scenario?

Frequently the DEIS makes assumptions that are based upon inadequate information. At times this is explicitly stated (as in the discussion of the potential impacts of toxic spills upon endangered flora and fauna). I will not address acknowledged insufficiencies, but will limit my comments to those that are not acknowledged.

a. Health effects of exposure to hydrazines and nitrogen tetroxide

Given that the purpose of any environmental impact statement is to disclose a project's potential effects, I believe that at some point the DEIS for the space launch facility should include prominently a description of the health effects resulting from huamn exposure to nitrogen tetroxide and to the various hydrazines to be used as propellants in the Delta and Atlas launch vehicles. Rather than being a part of the text, however, the cursory descriptions of the health effects of chemicals of concern are buried in an appendix to the health risk assessment.

Moreover, the sufficiency of the descriptions is questionable. I believe they tend to understate the life-threatening risks that can accompany inhalation of air that contains even minute quantities of hydrazines and nitrogen tetroxide.

I would suggest including as an appendix to the health risk assessment a study that describes these effects. One such study is "Clinical Manifestations of Exposure to Nitrogen Tetroxide and Hydrazine Propellants," by Col. Bruce J. Poitrast and Col. Karen A. Meier, both officers with the U.S. Air Force. (This study was published in the *Medical Bulletin of the U.S. Army Medical Department*, February 1988.) I attach a complete copy to my comments. I believe their report provides in a form more direct and accessible than anything in the DEIS a summary of the health effects of these chemicals.

In addition, the Poitrast and Meier report includes a discussion of the health effects resulting from exposure to a breakdown product of UDMH (unsymmetrical dimethylhydrazine): "UDMH is a respiratory irritant and a convulsant. In high concentrations, it can cause pulmonary edema. UDMH is also a carcinogen suspect.

"When UDMH vapors are exposed to air, an oxidation process occurs producing varying quantities of NDMA [N-nitrosodimethylamine]. It is highly toxic in animals and man. Routes of entry are inhalatino and possibly percutaneous absorption. Systemically, NDMA poisoning causes nausea, vomiting, abdominal cramps and diarrhea.... Human cases have been reported to show sevre liver damage. One autopsy revealed acute diffuse

centrolobular necrosis of the liver. NDMA is a highly potent carcinogen in several animal species, producing malignant tumors of the liver, kidney, and lung. *To date, a safe exposure standard has not been established. Therefore, all contact with NDMA should be avoided. Exposure to NDMA must always be considered when working with UDMH.*" (Emphasis added.)

The discussion in the DEIS (at Volume 6, Appendix A, pages A-23-25) of the harmful properties of NDMA (or DNMA, as it is alternately referred to) differs substantially from that in Poitrast and Meier. As though to minimize the concern, the DEIS states that DMNA "is also present in a variety of foods including cheeses, soybean oil, canned fruit, meat products, fish products, and alcoholic beverages. Concentrations in these foodstuffs have been measured to be 0 [sic] - 85 µg/kg."

It is, of course, nonsense to talk about something being found at 0 concentration. More important, however, is the fact that these concentrations are not put into perspective. The microgram-per-kilogram measure represents a concentration in the range of parts per billion units weight. The DEIS provides no way of translating this concentration by weight into the equivalent concentration by volume that it represents. In other words, if I eat a piece of cheese (containing presumably more than the 0 micrograms/kilogram concentration of DMNA), what is the equivalent exposure if I inhale air with some fraction of DMNA? The DEIS states that "the average daily intake of DMNA has been estimated to be 0.006-0.012 µg from water and 0.002 µg from air."

The DEIS should provide a frame of reference so that the reader will be able to figure out just how much larger the possible exposure to DMNA will be as a result of being in close proximity to DMNA as a result of a spill or other accident involving UDMH. Otherwise, it seems to me that the references to food containing DMNA serve only to suggest somehow that DMNA is a relatively benign substance.

b. Use of 60-minute mean concentrations

The practice of averaging concentrations over a 60-minute period -- thereby "diluting" them -- needs to be justified. If initial exposures are high enough to cause severe injury (and, according to ACTA, they could be so high), the exposed population will not live out the hour over which the "mean" exposure occurs.

I am well aware of the use of such averages in calculating exposure guidelines. However, the utility of these averages diminishes as concentrations increase. When one gets to the extremely high concentrations anticipated in the scenarios discussed above, the use of 60-minute mean concentrations needs to be justified.

c. **Hazmat Team response time**

In discussions of spill scenarios, the DEIS states that the risks will be minimized by the presence of a hazard materials response team that will accompany all fuel shipments. Work-safety requirements call for members of these hazmat teams to be properly attired before attending to spill clean-up so that they will themselves not succumb to the effects of exposure.

In spills involving nitrogen tetroxide and hydrazine fuels, the proper attire is quite elaborate indeed, calling for, among other things, self-contained breathing apparatus, impermeable cover-all suits, masks, and the like. At no point in the DEIS is there any discussion of the time that a response team will require to suit up and begin the clean-up work.

It is my contention that the 15-minute spill scenario used in the report on human health risks is dramatically *understated*, in light of the insufficient information on hazmat team response time. I believe that the DEIS should include a discussion of the way in which this hazard response team would operate (containing, among other things, a realistic description of the time required for it to suit up). Absent such a discussion, the DEIS is not justified in assuming that a spill can be cleaned up in either 15 minutes or 30 minutes.

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Besides the incomplete information and inconsistent assumptions, the EIS also contains assumptions that lack any justification. Some examples:

a. **Rupture of only one container in spill**

The basis for calculating all of the accidental spill scenarios is the assumption that only one container will rupture. This assumption needs to be explained.

It would seem that the DEIS would have readers believe that the strength of the containers and the unlikelihood of an accident are supportive of the assumption that only one container (among several included in a shipment) will rupture.

This is not so. One might just as easily argue that, given the strength of the containers, if an accident causes an impact sufficient to cause one of them to rupture, it could just as easily cause the rupture of two or more containers.

b. **Single-chemical involvement in on-site spill**

In the Human Health Risk Assessment (Volume VIII, Appendix

A, Page 6-4), the statement is made: "Assumptions made in the evaluation of the [on-site] spill scenarios ... include instantaneous release (15 seconds or less) of a single chemical to minimize the likelihood of an explosive reaction and maximize the resulting pool and subsequent total mass evaporation rate."

Should there not be a description of what would happen if there *was* an explosive reaction (that is, what would happen if a spill occurred that involved an oxidizer and an oxidant)? Again, if there is some event that causes the rupture of one storage facility or on-pad tank, is it not reasonable to think that others subjected to the same event (say, an earthquake) may rupture?

What would happen if the storage tanks for nitrogen tetroxide and hydrazine were to spill on-site at the same time and cause an explosion? Is this scenario too far-fetched to consider? If so, this needs to be explained.

The document contains errors and misstatements.

a. **Highway 11 at Kea`au**

The DEIS selects sites for study of the impacts of accidental spills in transit based on certain criteria, including where lane mergers. One site in the Kea`au area is selected for study, on the basis of it being the point where the highway shrinks from four lanes to two.

Actually, the point where the shift from four to two lanes occurs is more than a mile distant from the point selected for study. This results in a far different potential impact. The DEIS should be corrected to reflect the on-the-ground situation.

b. **Misstatement of exposure risk**

In Volume I, at page 5-42, the statement is made that the isopleth contours "reflect areas where mild effects could occur to the most sensitive groups."

This is not true. The contours show areas where short-term public exposure guidelines are *exceeded*. It is conceivable that on the fringes of the contours, where concentrations are just slightly above SPEGLs, more sensitive people might experience effects that more robust people would not experience.

Later, the DEIS would seem to contradict this assertion. On page 5-48, for example, one finds the statement: "[T]he 'Immediately Dangerous to Life and Health' (IDLH) level of 50 ppm for nitrogen tetroxide would be exceeded at distances up to 100 to 120 meters (330 to 396 feet) from the spill site... [P]ersons within 20 meters (66 feet) ... could suffer severe adverse health

effects, even if the toxic hazard spill emergency response team following the transportation truck is able to cordon off the spill area, contain the spilled product, and either cover the spill with foam, plastic, etc., or remove it."

The DEIS makes a bogus comparison between the spill risks associated with the transport of hydrazine and nitrogen tetroxide, on the one hand, and chlorine, on the other. This has no place in the document.

In Volume I of the DEIS as well as in the Health Risk Assessment and the Risk Analysis for Transportation of Propellants, the comparison is made between the risks of transporting substances such as hydrazine and nitrogen tetroxide with those involved in the transport of chlorine.

For example, Volume VI, Appendix A contains a map depicting the 1-hour SPECL isopleth from a spill of chlorine (Figure 4-75, page 4-89). To a casual reader, the size of the area covered (that is, the area on the page that is shaded), while smaller than the shaded areas on maps for spills of hydrazine and nitrogen tetroxide, appears to be roughly comparable in size. It takes a close reader to notice that the map for the chlorine isopleth is drawn to a scale (1" = 800') that is far larger than the scale (1" = 2000') used to depict the isopleth for hydrazine and nitrogen tetroxide.

If comparisons are to be made, then the map scales must be the same. As presented, the DEIS verges on dishonesty by using such vastly different scales to indicate areas that would be engulfed by spills of these substances.

According to the Transport Risk Assessment (Volume 6, Appendix A, page 1-2), "The purpose of this analysis [of chlorine spills] was to compare the risk from transporting rocket fuels with that associated with the transportation of chlorine. Chlorine is used and transported throughout Hawai'i and so it can reasonably be assumed that the associated transportation related risk is tacitly accepted by the local population."

Setting aside for the moment the incomparability of health risk (that of exposure to rocket fuels being far greater than that of exposure to chlorine), the statement just quoted is not something that I believe should be accepted at face value. Many people accept the risk of chlorine transport knowing that there is a public benefit accompanying such risk (i.e., cleaner drinking water and, through the use of chlorine at sewage treatment plants, cleaner near-shore water). In the eyes of many people in Hawai'i, there is no public benefit associated with the transport of rocket propellants. (For more on this, see Volume 9, Appendix C, "Sociocultural Impacts," as well as many articles in the local media indicating a lack of popular support for a space

launch facility.) To surmise that, because the public accepts risks associated with chlorine transport, it will also accept risks associated with rocket propellant transport is, I submit, a totally unjustified -- and unsupportable -- leap of spurious logic.

For these reasons, I believe that the all discussion and maps concerning the risk of chlorine -- which will *not* be transported as part of the spaceport operations -- should be stricken from the final EIS. As things stand, the discussion of chlorine and what is purported to be the public's "tacit" acceptance of associated risks smack of advocacy and apology rather than disclosure.

I would argue, also, that the DEIS minimizes the possible health risks from a spill of liquid fuel.

On page 13-8 of "Human Health Risk Assessment" (Volume 6, Appendix A), the statement is made that, "The maximum hazard index projected to occur due to a transporation spill of hydrazine, 340, occurs at Location 1, Hilo Harbor... Maximum acute hazard index due to a transportation spill of N_2O_4 -- 510 -- occurs at Location 1 during daytime conditions....Airborne concentrations of spilled hydrazine and N_2O_4 only fall below their 1-hour acceptable exposrue levels at distance greater than 600-1000 meters from the spill site. There, a significant hazard exists for adverse health effects -- however mild or transitory (e.g., respiratory irritation) -- to occur to persons living, working, playing or traveling through an area of significant size near a spill site."

In light of the Poitrast and Meier study, as well as others too numerous to mention, I take exception to the characterization of effects as possibly "mild or transitory (e.g., respiratory irritation)." As shown in the passages quoted above, even moderate exposure may result in symptoms requiring treatment for up to two months. At the concentrations predicted to occur in the ACTA spill scenarios, someone standing 20 meters from a spill of nitrogen tetroxide would be exposed to concentrations of 748 parts per million (assuming a 15-minute pool time, and averaging the concentration of chemical released during that 15-minute period out over one hour). If the 30-minute pool time is assumed, the ACTA study indicates the 60-minute mean exposure would be 1,434 ppm. (It is appropriate, in this connection, to note that the short-term public exposure guideline level for nitrogen tetroxide is 0.12 ppm.) Concentrations for the period of time it takes to clean up the spill would be many times higher than these 60-minute averages.

In this same vein, I question the methodology used in the development of the spill scenarios. The result seems to be the

depiction of scenarios that leads the reader to believe that the wind will carry the plume in just two directions (one for daytime spills, and one for night-time spills). As a glance at a wind rose will show, breezes in Hawai`i can blow in all directions over the course of a year.

The maps showing the isopleths would be helped by the addition of a wind rose to show the frequency of wind directions in the areas depicted. This will alert the reader that the shaded areas depict the area that will be engulfed by high concentrations of toxic substances are only two of many possible scenarios. For example, in Hilo, at the intersection of Highway 11 and Kalanianaole Avenue, winds blow from the south about 15 percent of the time. Should a spill occur when winds are from this direction, the plume would engulf the hotels along Banyan Drive. The general failure of the plume maps to indicate the wide range of wind directions tends to suggest to readers and reviewers that the plumes will go in just the two directions indicated.

One might reasonably argue that this methodology does not depict worst-case scenarios -- or even reasonable worst-case scenarios -- for spills. Rather, its use simply is a convenience, having no logical relationship to a worst-case at all.

A number of additional concerns need to be addressed. For example, expert testimony at a meeting of the Hawai`i County Council Planning Committee brought out clearly the need for consideration of the phenomenon of subsidence at the Palima Point site; the need for far more study in the area of ocean currents and impact on marine life; the need for basic data concerning wind patterns at altitudes above the inversion layer. Moreover, the DEIS must include a more adequate discussion than that provided in the socioeconomic technical report of the financial feasibility of the project -- one based on data attributable to a reliable, disclosed source.

Finally, let me state vehemently my objections to the proposed management plan, including the reprehensible and obvious scheme to exclude spaceport opponents (a sizable proportion of the Ka`u community, I might note) from any participation in either of the two advisory committees to the proposed spaceport authority (the scientific and the citizens advisory committee). While with respect to the latter the technical report states it should "(1) advise ... the Board on the attitudes, observations and concerns of the citizens of the Big Island regarding Spaceport [sic] in order to resolve potential problems, and (2) inform residents and elicit support for Spaceport within the community." Already the people charged with development of the spaceport to this point

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have justly been accused of excluding the voices of broad sectors of the community where support is perceived to be thin. This proposed "advisory" body would institutionalize that exclusion -- in a committee that, moreover, is the *only* means by which citizen concerns can be transmitted to the virtually autonomous spaceport board of directors.

Mr. Hannemann, I realize that you were at one point employed in the private sector by C. Brewer and worked in the Ka`u district, in an effort to drum up community support for this moribund and desperate proposal. Nonetheless, I am hopeful that you will be judging this DEIS as well as the matter of the very pursuit of the spaceport itself with all the distance and disinterestedness that is required. Even with the DEIS' shortcomings and deficiencies, there is still enough information in this shelfful of studies to warrant a no-go decision on the spaceport.

Thank you for responding to my concerns.

Yours truly,

Patricia Tummons

Patricia Tummons

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SEP. 30 1994

Ms. Patricia Tummons
187-C Hokulani St.
Hilo, HI 96720

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Ms. Tummons:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

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ACTA Inc., Dr. Richard Brock, Decision Analysts Hawaii, Inc., Engineering-Science, Inc, and Risk Science Associates contributed to the following responses.

Comment: *In the Health Risk Assessment (HRA), hazard and cancer rates are conducted for populations presumed to be exposed to chemicals released once per 70 year lifetime. This is not consistent with the launch failure rate cited in Volume VID. I suggest that the health risk assessment must be redone so that the predicted health effects are more in keeping with the projected launch failure rates. Second, I would suggest that the impact study include some discussion of the deflagration frequencies and predicted occurrences at the space launch facility. Otherwise, there is no basis for the once in 70 years assumption for the deflagration frequency rate.*

Response: As noted in Appendix VID, during the history of the Delta series of launch vehicles from 1960 to 1990 there have been 12 failures in 201 launch attempts. Of these 12 failures, only 4 were related to Stage 1 or solid rocket motor failures that affect the early phases of a launch. There has been only 1 Delta rocket failure since 1986, and none of the Delta II vehicles have failed. The Atlas series of vehicles experienced 32 failures in 245 launch attempts from 1958 to 1990. Most of these failures occurred prior to 1965. From 1970 to 1980 there were 100 launches and 10 failures. Based on the conceptual plan launch schedules, however, it would not be unreasonable to expect more than one conflagration or deflagration type vehicle failure over a 15 year period.

The Health Risk Assessment (HRA) is based on the reasonable maximum exposure (RME) scenario specified by EPA in its "Risk Assessment Guidance for Superfund". This RME scenario is defined as the highest exposure that is reasonably expected to occur at a site. According to EPA RAGS, "The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures." Because exposures from conflagration or deflagration occur on a single event basis (and there is no way to predict when they would occur), the health effects are evaluated on the basis of a single exposure over a 70 year lifetime. Multiple exposures are easily derived by multiplying the single exposure risks by the number of exposures.

The HRA analyses are conservative overestimates because the effect of mitigating measures are not included. Launches will be constrained (held), if the meteorological conditions, in combination with the hazard of the accident, produce unacceptably high levels of toxicity to the nearby communities.

Comment: *There is an acknowledgement in Volume VIII that adjustments have been made in the case of two of the assumptions (those dealing with pool depth and the number of containers*

of hypergolic fuel that would be ruptured in a spill). I would be more confident if the study were revised so that the changes in assumptions would be contained in the report itself, rather than merely in a prefatory comment:

Response: We find it regrettable, too, that the study could not be revised. Unfortunately, the assumptions you refer to were carried over from an earlier version of the report and were not discovered in time before the documents were scheduled for print. We would like to assure you, once again, that the report is based on the assumptions stated in the prefatory comment.

Comment: *Preparers of the ACTA report were instructed to "select events that will produce the highest risk and community impact". On what basis, therefore, does the HRA choose to base its calculations on the 15-minute spill scenario as opposed to the 30-minute spill scenario?*

Response: In the quantitative analysis of the transportation accident scenario, the type and magnitude of impacts were estimated. This analysis was conducted such that "catastrophic (and unlikely) events of instantaneous (15 seconds or less) spills of an entire tank, drum or cylinder were analyzed to evaluate the magnitude of the consequences and to consider possible risk management" (see page 5-41 of Volume I of the DEIS).

Reevaluation of the transportation accident scenario assuming spill of more than one barrel is not required nor would it be informative because spill of one barrel in a transportation accident has already been shown to result in significant impacts on nearby residents and workers: *"The results of the EIS analyses indicate that increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide"* (page S-4 of Volume I). An analysis of multiple drums spilled would just reaffirm the findings of significant risk.

According to Dr. Greenberg of Risk Science Associates, extensive experience as well as interviews with hazardous materials response officials support the use of a 7.5 to 15 minute time frame for start of spill control to full containment. It must be remembered that the hazardous materials response team will travel in the convoy and be partially suited-up. Their efforts will be directed immediately toward spill containment after donning respirators and gloves. Anyone who has ever worn full protective equipment or who has even witnessed a hazardous materials response demonstration knows that a self contained breathing apparatus can be donned and the protective suit sealed in a matter of minutes. In fact, the emergency response personnel consulted for this project stated that under these specific conditions of transportation, containment and covering of a one drum spill could be accomplished in 10 minutes.

The 55-gallon drums used to transport and store hydrazine, UDMH, and Aerozine-50 are unlikely to break because, under DOT performance standards, the design of a drum must be tested and officially certified before it can be used to carry hazardous materials (page 3-2 of Appendix VIA prepared by ACTA and page 5-54 of Volume I). According to ACTA, *"the strength and integrity of drums are established by a series of performance tests, which the drum must pass before it can be used to carry hazardous materials. The tests are a 6-foot-drop test, a stacking test, a leak test, and a hydrostatic pressure test."* ACTA concluded that, based on federal regulations for proper bracing of containers during transit, the rupture of more than one drum or one cylinder per truck accident is considered to be unlikely.

In over thirty years of transporting rocket fuels from the Mississippi River to Vandenberg Air Force Base, ACTA is aware of only a few instances where a release to the environment occurred. ACTA is not aware of any accident where more than one container was breached. Vandenberg Air Force Base receives many rocket fuel shipments each year from the Mississippi River and considerably more in both quantity and volume than would likely be transported within Hawaii. These shipments are highly controlled as regard to the route, hazmat teams, time of day, transporting vehicle speed, etc. Experience, therefore, does not suggest that the breach of more than one container is a reasonable and realistic. ACTA is not aware of even the breach of one 55-gallon drum of hydrazine in a transportation accident in over 30 years of operation of U.S. launch facilities.

Comment: *The dEIS should include a prominent description of the health effects resulting from human exposure to nitrogen tetroxide and the various hydrazines to be used as propellants. Rather than being a part of the text, however, the cursory descriptions are buried in an appendix to the HRA. Moreover, the sufficiency of the descriptions is questionable. I believe they tend to understate the life-threatening risks that can accompany inhalation of air that contains even minute quantities of hydrazines and nitrogen tetroxide.*

The microgram per kilogram measure represents a concentration in the range of parts per billion units weight. The dEIS provides no way of translating this concentration by weight into the equivalent concentration by volume that it represents. In other words, if I eat a peice of cheese (presumably containing more than 0 micrograms/kilogram of DMNA), what is the equivalent exposure if I inhale air with some fraction of DMNA? The dEIS states that "the average daily intake of DMNA has been estimated to be 0.006-0.012 μg from water and 0.002 μg from air. The EIS should provide a frame of reference so that the reader will be able to figure out just how much larger the possible exposure to DMNA will be as a result of being in close proximity to DMNA as a result of a spill or other accident involving UDMH. Otherwise, it seems to me that the references to food containing DMNA serve only to suggest somehow that DMNA is a relatively benign substance.

Response: The dEIS does contain a description of the chemicals of concern in Volume I, pages 5-2 to 5-10. Please refer to this section and we think you will agree that the descriptions of effects are not understated. Also, it is important to consider that entire volumes are devoted to descriptions of these chemicals (as referenced in your letter), therefore, the EIS cannot possibly contain all of the information about these chemicals.

Information is given on use, physical and chemical properties, ambient levels, atmospheric fate and transport, absorption, distribution, and excretion, and health effects in animals and humans. Additionally, sources for unit risk factors, oral potency slopes, and acceptable exposure levels are also given.

Short-term effects due to exposure to hydrazine at 25 ppm may result in respiratory and eye irritation, possible central nervous system toxicity, convulsions, pulmonary edema, and liver damage. Respiratory and eye irritation and minor liver toxicity may occur as a result of exposure at 4 ppm (Comstock et al. 1954; Jacobson et al. 1955). For nitrogen dioxide, short-term exposures at 6-40 ppm for 5 minutes, 7-17 ppm for 10 minutes, or 0.7-5 ppm for 15-40 minutes may result in increased airway resistance (NRC 1985a). Exposure effects are summarized in Tables 1 and 2 of the response to this comment.

Careful reading of the toxicological profiles for UDMH and DMNA would make it apparent that the adverse health effects listed in your comment as being cited in the article by Poitrast and Meier are also listed in the health risk assessment. The profile for UDMH states that DMNA is a product of UDMH. By stating the ubiquitous nature of DMNA in foods, drinking water, and air, the DEIS does not attempt in any way to minimize the risk of exposure to DMNA or to suggest that it is a benign substance. Rather the DEIS cites information presented by the National Toxicology Program in its "Sixth Annual Report on Carcinogens" published in 1991 (NTP 1991).

As for your request for a frame of reference to compare the exposure concentration of DMNA resulting from an accident or spill involving UDMH, ambient concentrations of DMNA in 8 locations around the world are given on page A-24 of the health risk assessment contained in Appendix IIIA of the dEIS. These ambient concentrations (in $\mu g/m^3$) can be compared to the ground level concentrations (in $\mu g/m^3$) listed in the health risk assessment.

Comment: *The practice of averaging concentrations over a 60-minute period - thereby diluting them - needs to be justified. If initial exposures are high enough to cause severe injury (according to ACTA, they could be so high), the exposed population will not live out the hour over which the "mean" exposure occurs.*

Response: As stated in Appendix VID, the *"toxic hazards are perhaps the most difficult to define due to the multiplicity of guidelines and standards issued by the various government*

agencies. In general the allowable toxic chemical concentration (expressed in ppm) decreases as exposure times increase. Most industrial standards are based on the assumption of long term exposure...Rocket launches, fueling operations and other related operations, are relatively infrequent and short duration evenus...so the Air Force has adopted SPEGLs typically based on a one hour exposure assumption."

Because the models used to evaluate potential exposures resulting from normal and unsuccessful launches were developed for the Air Force, the output is consistent with the Air Force SPEGLs. The exposure criteria recommended by RSA are consistent with the more conservative criteria used by the Air Force prior to the 1989 revisions.

The Appendix VID continues by describing "tier levels" used by the Air Force to identify response actions to protect individuals exposed to the indicated concentrations. Tier 1 indicates, *"Control access and evacuate. Immediately dangerous to life and health. Concentrations pose significant risk to exposed personnel."* Tier 2: *"Seek shelter or evacuate. Exposure poses some risk to the average individual. Mitigate by remaining indoors and sealing outside air intakers."* Tier 3 refers to *"Sensitive Individuals. Exposure poses no hazard to normal individuals but asthmatics or other lung diseased people may be at some risk. Similar to California stage 3 air pollution alert."*

The entire exhaust cloud would typically pass over an area in an hour or less, and as you indicated, concentrations are expected to vary during that period from point to point within the cloud. As required by Superfund Amendments and Reauthorization Act (SARA), Title III, the emergency response plan developed for the spaceport would include provisions for the release of chemicals into the environment. SARA, Title III, also requires that potential large-scale emergencies involve comprehensive planning with the Local Emergency Planning Committee and nearby support agencies. If the spaceport were to become operational, appropriate measures would be developed by the Local Emergency Planning Committee to respond appropriately to emergencies that could affect populations, probably similar to the tier system referred to above developed by the Air Force.

Comment: *It is my contention that the 15-minute spill scenario used in the report is dramatically understated, in light of the insufficient information on hazmat team response time.*

Response: Part of this question concerns the basis of a 15-minutes response time. Please refer to the explanation provided to your third comment above. As indicated in Section 13 of the health risk assessment, *"The individual cancer risk from just one transportation spill involving hydrazine is significant."* On page 13-8, it is stated that *"adverse acute health effects may occur in the surrounding community as a result of these spills."* While recalculation of risks using a longer blanketing time, you suggested, would result in greater risks, reevaluation is not

required because use of a 15-minute blanketing time has already been shown to result in significant impacts on nearby residents.

Comment: *The basis for calculating all of the accidental spill scenarios is the assumption that only one container will rupture. This assumption needs to be explained.*

Response: Please refer to the response to your third comment above.

Comment: *Assumptions made in the evaluation of spill scenarios include an instantaneous release of a single chemical to minimize the likelihood of an explosive reaction and maximize the resulting pool and subsequent total mass evaporation rate. What would happen if the storage tanks for nitrogen tetroxide and hydrazine were to spill onsite and cause an explosion?*

Response: The toxic effects of chemicals reacted by an explosion that may pose a threat to the environment and people are expected to be less than the "cold spill" scenarios covered in the dEIS. As stated on page 5-128 of Volume I, *"Generally, spills involving unreacted hypergolic propellants pose the greatest hazard because the minimum vapor concentrations with toxic impacts are much below those those required to sustain a flame. This means the size of a toxic cloud is potentially much greater than that of a flammable cloud. For equal amounts of released propellants, therefore, the potential for toxic impacts is greater [for a cold spill] than for fire."*

An explosion causing the propellants to react could result in a "hot spill" as described on page 5-127 of Volume I. Reacted hypergolic propellants do not pose a toxic hazard, but the fires could be a hazard to people and property. Thus, from a toxic gas point-of-view, any explosion and ensuing fire will tend to reduce the quantity of material dispersed to the atmosphere and so reduce the quantity of materials deposited at off-site locations. It is likely that given the quantities of materials maintained on-site at any one time, the potential for toxic exposure to off-site populations from any conceivable scenario of this nature will be of less consequence than those discussed in the transportation study.

Given the distances from the site boundary, and the likely on-site location of fuels, the blast hazard caused by ignition of on-site fuels will be of lesser consequence than that discussed for blast scenarios elsewhere in the dEIS.

Comment: *The dEIS selects sites for study of the impacts of accidental spills in transit based on certain criteria, including where lanes merge. One site in the Kea'au area is selected for study, when actually, the point where the shift from four to two lanes occurs is more than a mile distant from the point selected for study.*

Response: As you correctly stated, the representative potential accident locations were selected on the basis of criteria that would tend to indicate a higher likelihood of an actual accident occurring at that location. We apologize for the inadvertent error, however, this does not affect the validity of the report. As mentioned, the locations are merely *representative* accident sites; it is acknowledged that accidents could take place at any point along the route. The isopleths are presented to give an indication of the magnitude of the potential hazard, and generally could be applied to nearby areas along the route, such as the point where the shift from four to two lanes occurs about 1 mile away from the location indicated in the study.

Comment: *On page 5-42, the statement is made that the isopleth contours "reflect areas where mild effects could occur to the most sensitive groups." This is not true. The contours show areas where short-term public exposure guidelines are exceeded.*

Response: Your observation is correct. We apologize for the inadvertent error and will revise Volume I accordingly.

Comment: *The dEIS makes a bogus comparison between the spill risks associated with the transport of hydrazine and nitrogen tetroxide, on the one hand, and chlorine, on the other. Many people accept the risk of chlorine transport knowing that there is a public benefit accompanying such risk, but in the eyes of many people in Hawaii, there is no public benefit associated with the transportation of rocket fuels. As things stand, the discussion of chlorine and what is purported to be the public's "tacit" acceptance of the associated risks smack of advocacy and apology rather than disclosure. If comparisons are to be made, then the map scales must be the same. As presented, the dEIS verges on dishonesty by using such vastly different scales to indicate areas that would be engulfed by these substances.*

Response: The chlorine spill scenario is simply presented to provide a frame of reference, such as you requested for DMNA in your earlier comment, above. It is assumed that if a launch facility is developed, the community would have weighed the potential risks disclosed in the dEIS against the public benefits (such as voice, video and data telecommunications, weather information, global monitoring, search and rescue, and positioning systems, etc.), just as they do for chlorine. The map scales are based on the best resolution within a standard 8.5 by 11 inch page. We assume that readers are intelligent enough to calculate the distances with the scales provided.

Comment: *The dEIS minimizes the possible health effects from a spill of liquid fuel.*

Response: Impacts from a transportation spill are summarized in Section 13 of the health risk assessment: *"The individual cancer risk from just one transportation spill involving hydrazine is significant."* On page 13-8, it is stated that *"Hazard index calculations for exposure via inhalation of airborne emissions released during a transportation spill indicate that adverse acute health effects may occur in the surrounding community as a result of these spills."* Also, on page 10-3 of the health risk assessment it is stated that *"Generally, at all locations, the airborne concentrations of hydrazine would fall below 0.12 ppm [the SPEGL] at 600 - 700 meters from the spill. The concentrations of N_2O_4 would only fall below 1.0 ppm at distances greater than 1000 meters. It should also be noted that the IDLH level of 50 ppm for N_2O_4 would be exceeded at distances up to 100 - 120 meters from the spill site."* This statement clearly indicates that acute adverse health effects due to a transportation spill of hydrazine are expected at distances up to 600-700 meters from the spill and that fatalities may occur resulting from a N_2O_4 spill at distances up to 100-120 meters from the spill.

Comment: *The depiction of the scenarios leads the reader to believe that the wind will carry the plume in just two directions. As a glance at a wind rose will show, breezes in Hawaii can blow in all directions in the course of a year. The maps showing the isopleths would be helped by the addition of a wind rose to show the frequency of wind directions in the areas depicted. This will alert the readers that the shaded areas that depict the area that will be engulfed by high concentrations are only two of many possible scenarios. For example, in Hilo, at the intersection of highway 11 and Kalanianaole Avenue, winds blow from the south about 15 percent of the time. Should a spill occur when the winds are from this direction, the plume would engulf the hotels along Banyan Drive.*

Response: You have raised several excellent points. We agree that inclusion of wind roses in subsequent studies, should an actual project be planned, would give a better indication of the wind directions and speeds that are most prevalent. This study was only a preliminary effort to scope the general hazards of transporting rocket propellants. Because wind roses were not available for most of the transportation route, meteorological conditions were provided by Dr. Thomas Schroeder. The daytime and nighttime conditions provided by Dr. Schroeder represent the lightest winds and associated high stability (which leads to the highest downwind concentrations) that could be expected at each representative accident location. The isopleths could be rotated in any direction, depending on which way the wind is blowing.

It was our understanding that the isopleths in the dEIS represent the direction that the lightest winds occur most frequently. Further examination of the weather data from Hilo shows that approximately 6 percent of the time the wind does blow from the south at speeds less than 5 meters per second. By rotating the isopleth in the direction of the hotels along Banyan Drive, however, only a small portion of one corner of the southernmost hotel is affected, and this is at the outer edge of the contour where the concentrations are expected to be lower. It is likely, therefore, that a release of toxic material toward the east, as

demonstrated by the isopleth presented in the study, would potentially affect more people than if the wind direction was north, as you indicated, toward the hotels.

Again, it should be emphasized that the transportation analysis was based on a conceptual plan. As stated on page S-15 of the Executive Summary under Unresolved Issues, *"A more detailed risk assessment of transportation of propellants must be conducted when the actual propellants to be transported are known."*

Comment: *A number of additional concerns need to be addressed. For example, subsidence at Palima Point; ocean currents and the impact on marine life; the need for data concerning wind patterns at all altitudes above the inversion layer, and a more adequate discussion of the financial feasibility of the project.*

Response: Ground subsidence is discussed in the dEIS under geologic hazards and earthquakes (Appendix IIIA, page 11-12). This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Plate 2, Appendix IIIA). As stated on page 13 of the Appendix, *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment included in the Appendix notes: *"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up."* The ACTA report continues *"... regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka'u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."*

Additional data regarding ground subsidence and cracking is presented in the ACTA report describing specific historical events such as the 2 April, 1868 and 29 November, 1975 earthquakes. Furthermore, the ACTA report discusses the earthquake-induced ground failures including "extension and contraction failures (cracks)" and "coastal inundation resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are

specifically addressed in the ACTA Seismic Risk Assessment for the three "design" earthquakes under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS recommends *"siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report."* More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in Appendix IIIA. Specific mitigations mentioned include: *"locate hazardous facilities away from known geologic hazards;"* and *"carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."*

Regarding ocean currents and marine life, it should be recognized that the organic contaminants released by launch vehicles are not bioaccumulated or bioconcentrated as discussed by Dr. Greenberg (RSA). Secondly, aluminum is far more prevalent than most people realize in Hawaiian (volcanic) soils. There are significant deposits of aluminum (bauxite) on Kauai and with no discernible biological effects.

The tidally driven coastal currents along much of Hawaii's coasts are not well-known. It should be remembered that the ocean fronting Palima Point is very rough and exposed to the NE trades. Any pollutant reaching the ocean either via an "on-land" accident or from normal launch operations would be very rapidly diluted just because of the rough nature of the ocean in the area. Additionally, one should note that water depth increases rapidly along the coast from the shore. The "shelf" on which one finds hermatypic corals (the usual corals of coral reefs which are normally restricted to water less than 200 ft deep) is within 100 yards of shore along much of the area; in other words, normal coral reef communities are restricted to a very narrow band along most of this coast and open ocean conditions exist right up to the shore. Thus with surface or shoreline input, the benthic (bottom) communities would probably have little if any opportunity for exposure to any pollutant coming into the system at the surface or carried in by groundwater.

In further response to this comment, it should be noted that if these launches were polluting the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg AFB facilities. One of the best "de-facto" wildlife preserves is right adjacent to the Canaveral launch facility. This preserve is maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. This preserve (the Merritt Island Wildlife Refuge) is an estuarine system with relatively low water circulation -- just the opposite of Palima Point in terms of water movement. Additionally at Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

The high energy conditions suggest that any pollutant reaching the ocean would probably be very rapidly diluted and avected out of the nearshore (read coral reef community) area. This conclusion was reached by DBEDT's consultant, Dr. Richard Brock, who has studied for more than 10 years the fate of potential pollutants emanating from development along the Kona coast where the bottom topography is similar (but usually less steep) and the currents and water motion characteristics are very much less than observed around Palima Point.

It should also be realized that the organic contaminants that are released by the launch vehicles are not bioaccumulated and that aluminum released into the environment is not a foreign substance in Hawaii; significant aluminum exists in Hawaiian soils (especially on Kauai in the form of bauxite).

Finally, we recognize that if the project were to proceed, a comprehensive monitoring program should be in place to insure that the integrity of air, ground and nearshore marine waters and communities are not compromised.

An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would <u>not</u> carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis showed easterly winds (winds from the east) during an east launch to be the direction of primary concern. Data from the higher altitudes (approximately 18 km and above) showed a significant percentage of the wind directions from the east. A copy of the report is attached. Additional analyses of the wind speed field would further refine the launch constraints.

As noted in the Executive Summary under Unresolved Issues, *"Extensive meterological monitoring (of at least one year's duration) from ground level to the upper atmosphere may be required." In addition, "Modeling of particulate transport in the stratosphere and troposphere must be conducted to evaluate potential impacts on astronomy observations at MKO and to determine specific launch restrictions."*

The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. This exceeds the available number of launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: *Let me state vehemently my objections to the proposed management plan, including the reprehensible and obvious scheme to exclude spaceport opponents from any participation in either of the two advisory committees to the proposed spaceport authority.*

Response: The State Spaceport Management Plan, Appendix XE, is conceptual. It proposes the principal participants involved in developing and operating the launch facility. Among them are the Authority and a Citizens' Advisory Committee. The Citizen's Advisory Committee, which would have direct access to the Authority would (1) advise the Executive Director of the launch facility and the Board of Directors of the Authority on the attitudes, observations and concerns of the citizens of the Big Island regarding the launch facility in order to resolve potential problems; and (2) inform local Big Island residents about the facility and elicit support for it within the community. The role of the Authority would be to represent the interests of the State, that is, what is in the best short and long term interests of residents living throughout the State of Hawaii.

There are a number of State Authorities in Hawaii, such as the Natural Energy Laboratory of Hawaii Authority (NELHA) and the High Technology Development Corporation Authority. The primary role of any State Authority is to further economic development, since State Authorities are established to respond more quickly and flexibly than other government agencies can.

References:

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National Research Council (NRC). 1985a. "Emergency and Continuous Exposure Guidance Levels for Selected Airborne Contaminants. Volume 4." Prepared for the Department of the Army, Washington, D.C.

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Table 1. Hydrazine Toxicity

Level mg/m^3	Level ppm	No. of times greater than REL	Toxicity
0.16	0.12	1.0	resp. irritation; minor liver toxicity
5.2	4	33	resp. and eye irritation odor threshold; minor liver toxicity
32.5	25	208	all of the above plus possible CNS toxicity, convulsions and pulmonary edema and liver damage
65	50	416	all of the above plus liver damage
104	80	666	IDLH; all of the above plus possibility of serious liver and kidney damage and death

REL for hydrazine = 0.12 ppm

Table 2. N_2O_4 Toxicity

Level mg/m³	Level ppm	Time min	No. of times greater than REL	Toxicity
2.8	1.5	45	1.5	during exercise; increased airway resistance
1.3-3.8	0.7-2	20	0.7-2	increased airway resistance
3.0-3.8	1.6-2	15	1.6-2	increased airway resistance
5.6	3	45	3	increased airway resistance
9.4	5	15	5	increased airway resistance
7.5-9.4	4-5	15	4-5	decreased pulmonary diffusing capacity
7.5-9.4	4-5	40	4-5	increased airway resistance
13.2-32	7-17	10	7-17	increased airway resistance
11.3-75.2	6-40	5	6-40	increased airway resistance
94	50	---	50	IDLH
470	250	4.7	250	diffuse pneumonitis at 24 hr, clearing in 5 dy (astronauts)

REL for N_2O_4 = 1.0 ppm

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: JT Turner Date: 11/22/93

Name and address:
Jeffrey L. Turner
PO Box 3220
Kailua-Kona HI 96745

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-482

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
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SEP. 30 1994

Mr. Jeffrey Turner
P.O. Box 3220
Kailua-Kona, HI 96745

Dear Mr. Turner:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I)

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-483

Post Office Box N
Kailua-Kona, Hawaii 96745-9012
Tel: (808) 326-7946 Fax: (808) 326-7474

November 22, 1993

Takeshi Yoshihara, Deputy Director
Office of Space Industry (OSI)
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM (DBEDT)
P. O. Box 2359
Honolulu, Hawaii 96804

VIA TELEFAX 1-586-2386

Subject: Draft Environmental Impact Statement (DEIS) for Commercial Satellite Launching Facility at Palima Point, Ka'u, Island of Hawaii

Dear Mr. Yoshihara:

The subject document has been reviewed by me in some detail, and I offer the following observations, questions, and comments on this proposal:

1. The proposed facility is planned for an area that is adjacent to a major fault zone and located in an area that poses the highest risk of hazardous lava inundation and major seismic activity. Recent statements from the Hawaii County Civil Defense administrator Harry Kim identify Palima Point as potentially the world's worst area for natural disasters. Given the dangers associated with and inherent in the rocket launching business itself, please explain the rationale for continuing to pursue this project.

2. Given that (a) the Preamble of the state's constitution affirms that "the people reserve the right to control their destiny, to nurture their integrity and culture, and to preserve the quality of life they desire," (b) the majority of people responding to an island-wide surveys conducted for the DEIS and by elected state officials were opposed to the development of the proposed project , and (c) the former director of OSI has publicly stated on more than one occasion that "the project will not be built if the people don't want it," please explain the basis for continued promotion of this project and the ongoing expenditure of public funds by OSI. Further, please include information on how public consensus was obtained to pursue this idea in the first place.

3. Consistent with constitutional mandates, the state has enacted legislation to prohibit the launch of space vehicles within its territory that carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source. Nevertheless, the state attorney general believes that such a prohibition could be preempted by federal law and thereby deprive the state, and Hawaii county in particular, the authority to approve of and control a space vehicle's payload or fuel source. During public presentations, OSI has made emphatic statements to the effect that launches from the Palima site will not contain the prohibited materials. Please explain what mechanisms are or will be in place that will guarantee that the stated prohibitions will be honored. If none are or will be present, how can the state legally allow any expenditure of public funds for a project that will have no safeguards to prevent violation of its own statutes?

4. On October 30, the Association of Hawaiian Civic Clubs (AOHCC) met in national convention and unanimously passed a resolution urging the state, and DEBDT in particular, to (a) discontinue all plans to promote and develop a spaceport on Hawaii island, (b) prohibit any additional expenditures of public funds toward such a development, and (c) close OSI. Over 245 delegates attended that convention, representing 46 clubs from 8 states and more than 2500 constituents. If you had the opportunity to address these citizens, what logical justification would you give them for continuing to promote the project, expending more public funds, and keeping OSI open?

5. On November 1, the Hawaii County Council heard testimony that the DEIS failed to adequately address natural disasters, public evacuation procedures, and shoreline contamination. Mr. Kim further noted that spilled rocket propellants would forever impact the natural resources in the area and condemn the area for the life of the land. Given that the state of Hawaii has adopted as its motto that the "life of the land is perpetuated in righteousness," this was, in my estimation, a very telling commentary on the magnitude of the risks associated with this project. Given that Article XI, Section 1 of the state constitution mandates that the state "shall conserve and protect Hawaii's natural beauty and all natural resources and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of self-sufficiency of the state," it would appear that any further action by your office to promote this project would be contrary to this mandate and possibly be found to be unconstitutional. On this basis alone, please explain why this project should not be terminated immediately.

6. On November 17, based on evidence presented at the November 1 hearing, the Hawaii County Council unanimously passed a resolution which characterizes the DEIS as wholly inadequate as a basis for approving the proposed project, and it requests the governor to halt the expenditure of any additional state funds for (a) remedial studies of the DEIS or (b) the facilitation, promotion, or subsidization of a rocket launch facility at Palima Point. It was reported in the media that, in defense of the project, you said it was "merely hypothetical", "not a real project", and that "it is important to complete the EIS." In light of the Council's action, please explain the reasoning behind those comments, and what you and OSI will present to the state legislature in defense of that position.

7. With the exception of a brief paragraph in Volume I of the DEIS, there is no mention or treatment of the state's trust obligations to its citizens under Section 5(f) of the Admissions Act. The DEIS states that there is a strong possibility that the public lands at the project site are ceded lands; in that case, the state must utilize these lands in a manner consistent with specifically identified purposes. Please explain how a rocket launching facility will fulfill this mandate. If it cannot, on what basis can the state and OSI continue to pursue the project?

8. 1978 amendments to the state constitution acknowledged this public trust and established the Office of Hawaiian Affairs (OHA) to "manage and administer the proceeds from the sale or disposition" of certain resources, including all pro-rata income and proceeds from that trust. The DEIS indicates that issue of OHA's rights to these proceeds "remains unresolved" while it also states that "it is likely that any proceeds the State receives from the development or operation of the project could be the subject of a claim by OHA." Recent news reports concerning multi-million dollar payments to OHA indicate this is not just likely but certain. Please explain this apparent discrepancy in the DEIS and what discussions or agreements, if any, have been held or made or are contemplated to compensate the OHA beneficiaries for their share of the project's proceeds or loss therefrom.

9. The DEIS proposes the establishment of a 10,400-acre population control zone (PCZ) on land and a 78-square mile control zone offshore. The latter, for the most part consists of ceded lands, although no mention of these is made in the DEIS. According to the former OSI director at a recent public meeting, only 25-35 percent of the PCZ is ceded land. Related directly to this is the matter of the original reservation in all government lands which makes them "subject to the rights of native tenants." In 1978, the state constitution was amended to reaffirm these traditional and customary rights. Although these rights have been upheld by the Hawaii Supreme Court, the extent of these rights is currently at issue before the Court. Nevertheless, there is no mention of or reference to these in the DEIS. Please explain this apparent discrepancy and plans to mitigate it. In terms of the social impact of the proposed action, what will be the effect of limited access on these rights? If they are to be limited and possibly extinguished, how will prior input and consent be obtained from the holders of these rights?

10. Given the mandate, under Chapter 91, Hawaii Revised Statutes, that the state must adopt statutes and regulations which establish specific procedures and criteria for the manner in which it is to administer and manage the public trust lands trust under Section 5(f) of the Admission Act, please provide information on, references to, or an explanation of the basis on which OSI will be able to restrict access to and future development of these public lands in the manner proposed. Also, please clarify if this planned disposition is consistent with the intent and terms of the 5(f) trust as established by the Federal government?

11. Since the Hawaii State Supreme Court has made it very clear that disputes concerning management of the ceded lands and rights of native tenants must be resolved before development takes place, and since these matters appear to have been left out of the DEIS, it is imperative that any further action in pursuit of this project be halted until such matters are resolved, and I strongly urge that OSI take such action immediately in consultation with DLNR, the state legislature, and, most importantly, the public, who will be directly affected. The magnitude of the ceded lands involved in this project should have dictated that OSI properly address the issue and the rights of all Hawaii's citizens at the outset. The failure to do so and to properly consider public sentiment regarding this project is cause for great concern. In a participatory democracy, the citizens expeet more of public agencies and their personnel.

Thank you for this opportunity to respond to the DEIS. If you have any questions regarding this letter, or if I can be of further help, please call me. I look forward to hearing from you soon regarding my inquiries.

Sincerely,

J. Curtis Tyler, III

cc: Norman Mizuguchi, Senate President
Joseph M. Souki, Speaker of the House
Clayton Hee, Chair, Board of Trustees, OHA
Keith Ahue, Director, DLNR
H. K. Bruss Keppler, President, Association of Hawaiian Civic Clubs

12-485

JOHN WAIHEE
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SEP. 30 1994

Mr. J. Curtis Tyler, III
P.O. Box N
Kailua-Kona, HI 96745-9012

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Tyler:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed ---and the efficacy of the mitigating measures presented---is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Jon K. Matsuoka, Ph.D., Davianna McGregor, Ph.D., Richard Brock, Ph.D., Risk Science Associates and ACTA Inc. contributed to this response.

Comment One: *Development of the facility in a high risk area.*

Response: The dEIS states the hazards in an objective and comprehensive manner, supplying possible mitigations that should be investigated in more detailed analyses if the proposed project were to proceed. Judgments about whether the benefits of constructing a commercial launching facility are worth the costs and risks are up to relevant government regulatory agencies, the legislature, and--through their elected representatives--members of the community. The role of the dEIS is to provide accurate and relevant information that will allow well-informed judgments. It should be noted, however, that a supplemental environmental impact statement would have to be completed before a launch facility could be developed at Palima Point. If and when a private developer proposes an actual project, geologic hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

Comment Two: *Explain the basis for continued promotion of this project and ongoing expenditure of public funds by OSI. Further, please include information on how public consensus was obtained to pursue this idea in the first place.*

Response: The historical background of the project was discussed in Volume I, Chapter One of the DEIS. In the early 1980s, under the direction of the High Technology Development Corporation (HTDC), a statewide high-technology strategy was developed to identify and promote several niche markets that might be appropriate for Hawaii. To increase Hawaii's role in high-technology areas, Governor John Waihee directed the State to investigate potential space-related activities which would be most appropriate for Hawaii. His goal was designed to: diversify and strengthen the economy of the State of Hawaii, provide training and career opportunities in high-technology fields within the state for Hawaii's youth, and build on the existing space-related research at the Mauna Kea Observatories, at Haleakala, and at the University of Hawaii.

In response to the Governor's initiative, DBED prepared a comprehensive evaluation of Hawaii's potential for space exploration and development. The 1987 study considered a broad range of economic, technical, environmental, social and cultural factors in making its recommendations (Arthur D. Little, 1987). As one approach, the study suggested that the State facilitate the development of launch services for small and mid-sized commercial and scientific satellites. Following this recommendation, DBED commissioned a study to identify those sites which might be suitable for operating a commercial launch facility.

In July 1988 the State Legislature created the Office of Space Industry (OSI) within DBED with the mandate being to "develop, coordinate, and monitor the progress of a strategic plan for Hawaii's space industry...."

To summarize, as documented above, consensus was implied through actions by the Governor and the legislature--as elected representatives of the public--to create and

fund the Office of Space Industry. As stated in the cover letter: *"After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time...Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services."*

Comment Three: *What mechanisms are in place to guarantee prohibitions against nuclear waste materials, weapons of destruction, etc.*

Response: Although it is possible that the federal government could challenge Act 172, the Hawaii Attorney General is required to defend the constitution and the laws of the State of Hawaii. Therefore, if the federal government or anyone else threatens to violate Act 172, the Attorney General would take legal steps to prevent the violation from occurring. Moreover, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment Four: *Justification for continuing to promote the project, etc.*

Response: Please refer to the cover letter for DBEDT's policy statement on the launch facility initiative.

Comment Five: *The dEIS fails to adequately address natural disasters, public evacuation procedures and shoreline contamination. Spilled rocket propellants would forever impact the natural resources in the area and condemn the area for the life of the land. Please explain why this project should not be terminated immediately.*

Response: Each of the issues that you mention were addressed in the context of a conceptual plan. In regard to natural disasters, it is stated in Volume I of the DEIS that *"Rocket propellants stored at the proposed launch facility pose a hazard to people and the environment in the event that an earthquake causes a failure of containment. The three principal consequences of propellant releases are leaks or spills, fires and explosions. Any one of the three may result in the other two."* The liquid propellants are very flammable and would most likely burn if released in a natural disaster. The ignited liquid propellants do not pose a toxic hazard, rather, the thermal energy from resulting fire or explosion would pose the greatest concern. As stated in Volume I, Chapter Five of the DEIS:

> *"Palima Point is located in a hazardous geologic area. Because of the frequency of earthquakes on the Big Island there is a potential for an earthquake to occur while a fully fueled rocket is on the launch pad. The possibility exists for the vehicle to topple over during a very strong earthquake. If this happens the liquid propellants will most likely ignite and the rocket will be consumed. The effects will be similar to the on-pad launch failure assessed in Volume I, Chapter Five of the dEIS."*

Given the propensity for earthquakes in the project area, the following should be incorporated into the launch facility design. See Appendix IIIA for a discussion of the following mitigations.

* Facility layouts should consider the effects of potential earthquakes.

* All facilities on the launch site should be designed to UBC 4 standards. Strict quality control procedures should be employed during all phases of construction.

* The design of safety equipment should insure that the most stringent protective measures are constructed. This equipment should be continually maintained during the operation of the facility. Personnel should be trained in the maintenance of fire suppression and other safety equipment.

* Emergency procedures must be planned before completion and operation of the facility so that personnel can be trained and appropriate documentation of the procedures can be delivered to the facility and government (State and local) agencies for perusal and preparedness.

The potential effects of spills that do not burn (cold spills) are presented in Volume I, Chapter Five of the DEIS. Toxic releases from spills of liquid propellants on the launch facility site are evaluated on page 5-127. In the analysis it is assumed that the entire contents of a storage vessel is released under worst case meteorological conditions (615 gallons of Aerozine-50 or 728 gallons of nitrogen tetroxide) and that the spilled liquid is allowed to remain and evaporate over time with no effort made at remediation. The resulting cancer risk due to a hydrazine release under this accidental scenario (which is highly unlikely but could conceivably occur as a result of a natural disaster such as an earthquake) is 9.5×10^{-4}. The maximum acute hazard index is 10.6 at Pahala. Thus, *"the individual cancer risk from just one on-site spill is significant. Acute and chronic adverse health effects in the surrounding community will also occur under unfavorable wind conditions from just one on-site spill."*

The risk analyses do not account for the mitigating measures that will be in place in the event of a natural disaster and the fact that remediation would be swift for such emergencies and procedures would be in place to minimize adverse effects.

In respect to potential lava inundation, if an eruption were known to be imminent, or underway, some portable/hazardous items and sensitive payloads could be removed before being overrun by lava. Such eruption prediction or forecasting has been successfully implemented by monitoring magma movements using seismicity data (and listening for volcanic tremor, etc.). More significantly, lava inundation of the entire Palima Point launch facilities would effect a complete permanent shut-down of the operation. Detailed contingency plans for such a shut-down will be adopted and regular drills will be conducted to ensure that all potentially hazardous facilities will be secured in such a manner their destruction will not present a threat to humans or sensitive species. Such procedures are required to be in place for facilities handling toxic materials.

The dEIS does not discuss the effects of severe wind storms on facilities. The meteorological studies performed for this study were for the evaluation of non-storm conditions and the effects on launches. It is obvious that no launches would take place in a storm. The concern with regard to a tropical storm is whether the facility can survive the storm and whether the addition of the facility will lead to any additional damage or risk to the surrounding community.

Structures can be sited, engineered and designed to satisfy these needs. Although they have not been subjected to a hurricane, Cape Canaveral and Kennedy Space Center are situated in an area vulnerable to severe storms. Because of the high capital investment required to develop a launch facility, it is certain that all structures will be engineered to sustain maximum design winds.

The costs of designing for severe storms will be a factor the launch site developer will consider (along with other cost issues such as risks from seismic and volcanic activity) before making a commitment to build at Palima Point. If an actual project is realized, then the siting, engineering, design, and operational features must be developed to address specific issues such as warning time, winds, rain and storm surge. Some of the design and operational issues pertaining to tropical storm threats that need to be considered by a developer/operator are:

* Is there sufficient time at the first notice of a potential storm to protect a vehicle that is scheduled for launch and may be partially built-up?

* Can hazardous materials such as liquid propellants be stored in such a way as to survive a storm without the storage vessel being breached and allowing a potentially dangerous spill?

* How will solid rocket motors be protected during a storm?

It should be noted that the ability to successfully secure hazardous materials during a severe storm was recently tested at Johnston Island during hurricane John.

Ground subsidence is discussed in the dEIS under geologic hazards and earthquakes (Appendix IIIA, page 11-12). This analysis includes zonation maps for ground subsidence and fracturing where the highest risk lies along the Southwest Rift Zone of Kilauea where the launch pads are located (Plate 2, Appendix IIIA). As stated on page 13 of the appendix:

> *"The hazard zonation map for ground subsidence and fracturing divides the site into the same zones as the lava flow zonation map. The area east of the southwest rift lies in Zone 1, which includes the rift zones of Kilauea. The area west of the southwest rift is in Zone 3, where fractures and subsidence due to the underground movement of magma occur less frequently than in Zones 1 and 2."*

In addition, the ACTA Seismic Risk Assessment included in the appendix (page 2) notes:

"The largest historically recorded earthquakes have involved large-scale seaward sliding along a sub-horizontal plane at the base of the volcanic pile above the ancient sea floor sediments. This large submarine displacement is accompanied by moderate-to-large local tsunami and subsidence of the coastal areas by one to several meters, which results in substantial damage due to inundation by tsunami run-up."

The ACTA report continues:

"...regional seaward movement of the south flank of the Island of Hawaii is also observed, especially in the southern Ka`u region, with geodetically-measured displacement of several tens of centimeters to a few meters. Tilting of the structural block, resulting in subsidence along the volcano rift axes and the coast, and with concurrent uplift occurring offshore, results in measurable local tsunamis being generated."

Additional data regarding ground subsidence and cracking is presented in the ACTA report describing specific historical events such as the 2 April, 1868 and 29 November, 1975 earthquakes. Furthermore, the ACTA report discusses the earthquake-induced ground failures including "extension and contraction failures (cracks)" and "coastal inundation resulting from subsidence and tsunami." Ground subsidence and fracturing (including extension) are specifically addressed in the ACTA Seismic Risk Assessment for the three "design" earthquakes (on pages 6-9) under the fault rupture and tectonic deformation headings.

Regarding mitigation measures for this hazard, the dEIS (Appendix IIIA, p. 18) recommends *"siting of the proposed facilities should avoid the problem areas (Zone 1 on the volcanic hazards maps, and cracks) described in this report"*. More detailed description of mitigations, although only a preliminary list and not exhaustive, is presented in the ACTA report included in Appendix IIIA of the dEIS. Specific mitigations mentioned include:

"locate hazardous facilities away from known geologic hazards; and

"carefully prepare the foundation: include filling or avoiding buried lava tubes or other potentially unstable ground conditions; base-isolation or reinforced foundations of critical or hazardous facilities may reduce earthquake-induced displacements."

It should be emphasized that the effects of subsidence, a volcanic eruption, an earthquake and/or a hurricane of sufficient magnitude to destroy the Spaceport and release the entire contents of the fuel storage facilities would be so great that the presence of hydrazine or other rocket fuels would be the least of Kau's worries. If and when a private developer proposes an actual project, natural hazards would certainly be investigated thoroughly before any money is invested at Palima Point.

In regard to spilled propellants, the potential effects of toxic releases from accidents (including natural disasters) on both human beings and the ecology are thoroughly described in the two risk assessment documents included in the dEIS as Appendices VIIIA and VIIIB and condensed in Volumes I and II. The Health Risk Assessment concluded that the risks for normal successful launches and abnormal launch failures were negligible. As noted above, health risks from on and off site accidental spills which are not immediately remediated could be significant. It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated:

"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."

The actual risks to the ecosystems from all activities associated with the facility is actually quite low. Potential adverse impacts from chemical pollution from launches, the threat of spills or other accidental releases and the possibility of releases caused by natural disaster are all addressed within the ten volumes of the dEIS, specifically the following:

Volume I:

Chapter Three, which describes the environmental setting of the proposed project;

Chapter Four assesses impacts from natural hazards, construction activities and routine launch facility operations; and,

Chapter Five, which discloses potential impacts from launch operations, transportation accidents and chemical spills, is organized by major groups of actions related to the following project elements: transportation of propellants and gases; launch events, including: normal launches and launch failures; hazardous operations including: propellant storage and handling, payload processing and accidental spills; and, special concerns, which includes analyses of project effects on the Mauna Kea and Mauna Loa Observatories and global and regional air quality.

Volume II:

Chapter Seven, which discusses sociocultural and recreation issues (including Hawaii Volcanoes National Park), and visual impacts;

Chapter Eight, which evaluates the cumulative effects of the proposed action and presents a summary of adverse impacts; the relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity; and, irreversible and irretrievable commitment of resources; and unresolved issues.

Technical Appendices:

Volume III, The Natural Environment, includes reports on geologic hazards; groundwater resources; botanical resources; birds and mammals; marine, anchialine and sea turtle resources; and, nearshore water quality.

Volume V, Facilities Construction and Use, includes reports on traffic; climate and air quality; drainage and flooding; and, construction impacts.

Volume VI, Launch Operations and Hazards (1), includes a hazard analysis for the transportation of propellants from Hilo to the site; accident risk assessments for handling and storage and payload processing facilities; and, an impact analysis of toxic spills, exhaust gases, and vehicles accident gases.

Volume VII, Launch Operations and Hazards (2), includes reports on debris dispersion effects from an aborted launch; acoustical noise impact evaluations; a survey of potential sonic boom consequences; and, explosive overpressure hazards.

Volume VIII, Human Health and Ecological Risk Assessments of toxic effects including: transportation of propellants, launches and accidental spills.

In regard to developing the natural resources at the Palima Point site,

"Most of the area within the PCZ is classified Agriculture by the State Land Use Commission; some of the coastal areas are in the State Conservation District (Figure II-4.3). County zoning is Agriculture (A-20-a) and Open; the coastal portions of the site are located within the County of Hawaii Special Management Area (Figure III-2.1). There are no residences within the PCZ.

"About 600 acres of land within the PCZ are planted in macadamia nut orchards and about 5 acres are planted in an experimental mango orchard. In addition, about 3,800 acres are being used for grazing cattle, while plans exist for about 1,600 of these acres to be used for a dairy. Also, tailwaters from the sugar mill flow onto lands within the PCZ. About 6,000 acres are vacant, most of which were used in the past for grazing cattle (DEIS Volume I, Chapter Three)."

Only about 1,000 to 1,200 acres of the Palima Point site would be developed for facilities; over 9,000 acres would be left in open space. Existing agricultural operations can continue.

It should be noted that if rocket launches were a threat to the environment, the problem should have manifested itself at other launch facilities such as the Canaveral and Vandenberg Air Force Base facilities in Florida and California. One of the best de facto wildlife preserves is right adjacent to the Canaveral launch facility. This preserve (the Merritt Island wildlife refuge) maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. At Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

12-489

As noted in Appendix IIID of the DEIS,

"Human activities such as urban and industrial development, dredging and commercial fishing potentially pose a threat to turtle populations and their habitat...It is the destruction or modification of beaches that has had the greatest impact on the ability of turtle populations to sustain their numbers."

Large open space areas at launch facilities that are restricted for safety reasons, where human activities and industrial development are not allowed, are features of Cape Canaveral and Vandenberg AFB. The open spaces provide valuable habitat for endangered sea turtles, alligators, and many bird species.

It is also stated in Appendix IIID that:

"Sea turtles nest on the beaches of Cape Canaveral launch facility in Florida. To alleviate concern over the impact that light may have on nesting and hatchling success...lighting procedures are inspected by the U.S. Fish and Wildlife service for compliance. The only nesting area in the boundaries of the project site is at Kamehame Hill...it is suggested that a light management plan similar to Cape Canaveral, Florida facility be developed for Palima Point if the launch facility is to be built."

The cover letter presents DBEDT's policy on the launch site initiative; there will be no further state participation at this time. It should be noted, however, that if the project were developed it would be the most closely watched and monitored of any development in the State. A comprehensive monitoring program--with strict enforcement provisions--would be in place to insure that the integrity of air, ground, water and the health of communities are not compromised. Prior to proceeding with the project, legislative authorization would be required. Various state, local, and federal agencies will address the concerns you have expressed. A partial list of applicable regulations and approvals required for the project is contained in Chapter 10 of Volume II.

Comment Six: *Present defense for "merely hypothetical", "not a real project" and "it is important to finish the EIS."*

Response: See the response to the previous statement.

The EIS process is not intended to promote a project; neither is it intended to stop a project. An EIS is intended to disclose facts and study results and propose mitigating measures. This is in accordance with the definition promulgated in the Environmental Impact Statement Rules, (Title 11, Chapter 200, Sect. 11-200-2) which states that:

"...an EIS means an informational document prepared in compliance with chapter 343, Hawaii Revised Statutes and this chapter and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic and social welfare of the community and state, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects and alternatives to the action and their environmental effects."

In compliance with chapter 343 Hawaii Revised Statutes and the Environmental Impact Statement rules, the dEIS attempts to disclose all significant impacts (both positive and negative)--generated as a result of certain activities and accidents related to the proposed project--in a non-judgmental manner. The objective is to provide as complete information as possible to the agencies and legislative bodies that will make the final decisions as to whether or not support of the project should be continued.

As stated in the dEIS (Volume I, Chapter One):

"The dEIS is programmatic in scope and should be considered as a guide to State decision-makers in determining whether or not resources should be allocated to site acquisition, permitting and further analytical studies related to the commercial space launch facility initiative."

We believe that the document serves its purpose; no further resources are being allocated for site acquisition, permitting and further analytical studies. The Department is, however, responding to comments received during the public review process.

Comment Seven: *Except for brief paragraph in Volume I of the DEIS, there is no mention or treatment of the state's trust obligations to its citizens under Section 5(f) of the Admissions Act. Please explain how a rocket launching facility will fulfill the mandate to utilize (ceded lands) in a manner consistent with specifically identified purposes.*

Response: Ceded lands are discussed in Appendix IXE of the dEIS. It is unclear what the impact would be at the present time. If an actual project is proposed, it will be necessary to conduct a title search to determine whether or not the state lands involved are actually ceded lands.

The use of ceded public lands on the island of Hawai`i is an issue of concern to Native Hawaiian beneficiaries of the trust. Inclusion of 2,228 acres within the Population Control Zone is of concern to the Ka`u Hawaiians, the Office of Hawaiian Affairs, and Hawaiian community organizations who advocate for sovereign control over those lands. These interests oppose long-term commitment of the ceded lands before Hawaiians have negotiated settlement of their sovereign claims.

Hui Na`auao, a Hawaiian sovereignty education group comprised of 48 different organizations and the Hawaiian Sovereignty Advisory Commission seek a moratorium on the alienation of the ceded lands from the trust until the establishment and recognition of a sovereign Hawaiian entity. As was the case with the establishment of a "safety zone" on ceded lands of Nohili for test rocket launches from the missile base, the Department of Land and Natural Resources would have to grant an easement in order for the Population Control Zone to be established. The granting of a easement would be subject to public hearings as required by the Chapter 91 Administrative Procedures Act. Thus, the Ka`u community and Hawaiian groups would be afforded an opportunity to register and express their concerns.

Comment Eight: *Recent news reports concerning payments to OHA indicate that the State would be subject to a claim from OHA. What discussions or agreements, if any, have been held or made or are contemplated to compensate the OHA beneficiaries.*

Response: Please refer to the response to comment seven. If and when an actual project is proposed, DLNR (as land agent) and OHA will conduct discussions on these matters.

Comment Nine: *The 1978 amendments to the state constitution reaffirmed the original reservation in all government lands which makes them "subject to the rights of native tenants." In terms of social impact of the proposed action, what will be the effect of limited access on these rights?*

Response: A preliminary records search failed to identify any hunting and gathering rights given to any particular native tenants on the lands mauka of the shoreline. Should an actual project be proposed this issue would be researched fully. The Conceptual Shoreline Access Management Plan (Appendix XE) addresses the shoreline issue:

"Chapter 115, Hawaii Revised Statues, guarantees the right of public access to the sea and shorelines and transit along the shorelines. In addition, the State Constitution guarantees these rights to Native Hawaiians. Most of the shoreline fronting the population control zone (PCZ) is on cliffs where there is no safe transit along the actual shoreline. The law, however, provides for public transit corridors along the makai boundaries of the site. The State intends to provide shoreline access along the entire area fronting the PCZ.

"This management plan is being prepared in order set forth guidelines that will maximize the hours that public access to the shoreline areas will be allowed and minimize the hours that access fronting the property will be restricted. The primary criterion for access restriction is public safety. Planning has been directed to limiting areas that must be restricted to the minimum required for safety and security."

The Plan addresses issues of public access to the project's shoreline and proposes management strategies. It should be noted that the plan is conceptual; the final plan will not be adopted until after extensive public and agency comment and review.

Issues pertinent to subsistence were addressed in Appendix IXD. The coastal areas within the project district in Ka`u were generally described in terms of access, shoreline features, and type of use. Spaceport development impacts were assessed according to how they would affect subsistence and recreation use of the areas. Although Hawaiians were not singled out as a group being affected, the high rates of subsistence among Hawaiians suggests that they would be the most severely impacted group among Ka`u residents.

Short-term, intermittent and long-term effects were assessed in the appendix. The cumulative effects were assessed in relation to population growth in the district, about one quarter of which would be attributable to Spaceport development. Population growth and increased pressure on existing ocean resources paired with restricted access to traditional areas would have adverse effects on subsistence and recreation. It was noted that as a group, Hawaiians would potentially bear the brunt of the impacts because subsistence is a vital part of their economy, culture, and spirituality.

Again, it should be emphasized that at the present time vehicular access to the property from Highway 11 is through locked gates controlled by the property owners. The Conceptual Shoreline Access Plan recommends that daytime public vehicular access to the shoreline along a paved road be allowed through a designed gate on the highway. The Plan also recommends parking areas and comfort stations be available at the shoreline. Daytime pedestrian access will also be allowed. It is the objective of the Shoreline Plan that daytime access will only be restricted during a launch or when dangerous operations are being undertaken.

Comments Ten and Eleven: *Regarding public trust lands.*

Response: See previous responses on this issue. The State would acquire land by proper legal procedures. If an actual project is proposed, such issues will be thoroughly researched and appropriate remedies will be taken. These actions will be appropriately addressed by the State.

DEC - 7 1993

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Theresa Villa

Date: 12.3.93

Name and address:

Theresa Villa
75-217 Nani Kailua Dr. #155
Kailua-Kona, HI 96740

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-492

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2408 Fax: (808) 586-2377

SEP. 30 1994

Ms. Theresa Villa
75-217 Nani Kailua Drive
#155
Kailua-Kona, HI 96740

Dear Ms. Villa:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed—and the efficacy of the mitigating measures presented—is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the State, County, and Federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

KKM
RF
Offiling

October 26, 1993

Governor John Waihee
State Capitol Building
Honolulu, Hawaii 96813

Dear Sir:

I am writing this letter, not only as a class assignment, but also because I am greatly concerned about the proposed space port being built on the island of Hawaii. I am against this proposal for several reasons.

The environment on the Big Island is extremely affected by the vog from the volcano on Mauna Kea. Many of our residents, especially children born within the last ten years, have serious eye, ear and nose infections because of the vog. There are days when we cannot even see our coastline and the horizon because of this problem. To build a spaceport will only add to this unhealthy situation.

We brag about the beaches to surf, camp and have picnics; we brag about the beauty of our mountains; we brag about the "lay-back" lifestyle of the residents . These things we will no longer be able to brag about if we build that spaceport. Ka'u will become an area that no only will want to visit because of the affect on the environment there.

We have been internationally acclaimed as the major place in the world to view the universe. How can we possible hold that position if we cause the air around that beautiful mountain to become polluted and thick with gases?

Please reconsider these arguments when making your final decision about this proposal. I do hope you will see these points as strong enough arguments against the spaceport. Thank you for your cooperation in this matter.

Sincerely,

Mark Wakata

Mark I. Wakata
P. O. Box ~~129~~ 2925
Kealakekua, HI 96750

12-494

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGERS
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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SEP. 30 1994

Mr. Mark I. Wakata
P.O. Box 2925
Kealakekua, HI 96750

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Wakata:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

Cultural Surveys Hawaii, Dr. Richard Brock, Decision Analysts Hawaii Inc., Engineering-Science Inc. and Risk Science Associates contributed to the following responses.

Comment: *The environment on the Big Island is extremely affected by the vog from the volcano on Mauna Kea. To build a spaceport will only add to this unhealthy situation.*

Response: Air quality impacts are discussed on page 4-26 of the dEIS. The dEIS states that *"the existing air quality in the project area is affected mostly by air pollutants from natural sources, transportation sources, and agricultural activities."* The dEIS further states that, under normal operating conditions of the proposed project, minimal emissions of RP-1 (kerosene vapor), hydrazine, MMH, and nitrogen tetroxide may occur during fuel loading activities for the Atlas IIAS. Emissions due to venting of RP-1 from storage tanks during propellant loading operations are expected to be minimal due to the low vapor pressure of this substance. Emissions of hydrazine during transfer and loading into rockets is expected to be minimal due to its low vapor pressure. Emissions of trichloroethylene may occur during rocket engine flush and could result in high maximum hourly hydrocarbon emissions. Releases of hypergolic propellants during Delta II normal pre-launch operations and scheduled post-launch maintenance are not expected to result in significant adverse impacts to the environment.

Emissions of EPA Criteria Pollutants are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Thus, impacts to ambient air quality, including visual impacts to scenic vistas, from the Hawaii spaceport are expected to be insignificant because the emissions are generated intermittently, and are of short duration.

Air quality effects from rocket launches are discussed on page 5-83 of the dEIS. Estimated annual launch exhaust emissions that would be generated from launch operations at the Hawaii Spaceport are: aluminum oxide (PM_{10})-100 tons/year, carbon monoxide-100.8 tons/year, and nitrogen oxides-8 tons/year. Thus, emissions of criteria pollutants during rocket launches are not expected to exceed the prevention of significant deterioration (PSD) limit of 250 tons/year. Cumulative impacts on air quality from launch operations, including visual impacts to scenic vistas, are not anticipated to be significant because of the intermittent nature of the vehicle launches.

Mitigation measures to be taken to avoid impact on population centers by the exhaust ground cloud will limit launches to times when meteorological conditions are favorable.

Impacts of spaceport employee vehicular trips and vehicular carbon monoxide effects were also assessed (see page 4-27 of the DEIS). Modeling results indicate that emissions generated by employee vehicles would result in an increase of 0.1 ppm by volume (114

$\mu g/m^3$) in the ambient concentration of CO. This value represents only one percent of the 1-hour HAAQS which is 10,000 $\mu g/m^3$. Thus, the air quality impact of mobile sources associated with the proposed project is considered insignificant.

Rocket launches would not cause a measurable increase in adverse effects to the population on the West side of the island, even when the emissions are added to those presently occurring from the volcano. As stated on page 5-161 of Volume I, *"Cumulative effects of pollutants emitted during launch episodes (from both successful launches and launch accidents) do not significantly contribute to the effects of chronic volcano emissions."*

Comment: *We brag about the beaches to surf, camp and have picnics, we brag about the beauty of our mountains; we brag about the "lay back" lifestyle of the residents. These things we will no longer be able to brag about if we build that spaceport. Ka'u will become an area that no one will want to visit because of the affect on the environment there.*

Response: As noted on page 3-24 of Volume I, the site is heavily disturbed by human activities. About 600 acres of land are planted macadamia nut orchards and about 5 acres are planted in mango orchards. In addition, about 3,800 acres are being used for grazing cattle, while plans exist for about 1,600 acres to be used for a dairy. Also, tailwaters from the sugar mill flow onto lands within the PCZ. About 6,000 acres are vacant, most of which were used in the past for cattle grazing.

Continued use for this area for agricultural purposes, particularly grazing and dairy farming, is not a guarantee that resources will be preserved. For example, there are many instances in the area in which cattle have impacted archaeological sites, either directly with the activity of hooves, or mechanical pasture improvement, such as vegetation clearing, chain-dragging and other bulldozing. It is also true that agricultural uses, generally, do not come under the permit process, so that protection of archaeological sites cannot be controlled through coordination with government agencies. The permitting process for the spaceport includes compliance with all environmental laws, including those related to archaeological sites. Mitigation procedures begin with inventory survey, and historical research, and also involve preparation, approval, and implementation of data recovery and preservation plans, as well as continued management.

As another example, during the several trips made by DBEDT's consultants to the Kamehame Hill area during field work (from 1990 to 1993), there was considerable evidence of camping on the beach in the form of tent pole structures, rubbish, and fire pits (a source of light detrimental to endangered turtles, as well as flashlights as evidenced by numerous expended dry cell batteries in the area.) With a management program in place that controls access, sensitive habitats (such as turtle nesting areas) and environmental resources (such as

archaeological sites) can be better protected; protection without such a program may not be possible.

Currently site access from Highway 11 is restricted due to locked gates. Improved access to the shoreline area may actually increase the level of public use between Punalu'u and Palima Point. Closures would temporarily disrupt coastal access and use, however, the intermittent effects of shoreline closure would be limited to between 10 and 40 days per year. Implementation of the Shoreline Access Management Plan will serve to mitigate concerns from both current and future users. Losses in revenue could be offset by compensation from the launch facility operators, as is the case at Vandenberg AFB and Cape Canaveral AFB.

It should be noted that if launches were polluting the environment, the problem should have manifested itself at other launch facilities such as the Cape Canaveral and Vandenberg AFB facilities. One of the best "de-facto" wildlife preserves is right adjacent to the Cape Canaveral launch facility. This preserve maintains high habitat quality and wildlife because residential and commercial land development has been restricted and the marsh habitat preserved. This preserve (the Merritt Island Wildlife Refuge) is an estuarine system with relatively low water circulation -- just the opposite of Palima Point in terms of water movement. Additionally at Vandenberg AFB, the endangered least tern maintains a colony within a few thousand feet of a launch pad; launch operations are suspended during the nesting season to protect these birds.

As stated in Volume II, Chapter Seven and in Appendix IXC, a resident survey indicated a strong preference for continuing existing lifestyles. The qualities of Ka'u that respondents felt should be preserved included its lifestyle, open space and shoreline, historic and archaeological sites, and fishing and gathering grounds. These qualities must be carefully considered during all stages of the project, if developed. Although a spaceport would predispose Ka'u to numerous social changes, it may also serve to restrict the amount of growth and subsequent social changes that occur in the immediate region. As no other development could occur within the population control zone (PCZ), the project area would be mostly open space.

The impact of the launch facility on tourism is addressed in Appendix IXA. As discussed in this Appendix, the facility would cause a small increase in tourism due to the addition of visiting workers and their families. Also, a number of visitors might be attracted to Ka'u to witness the occasional rocket launches.

Comment: *We have been internationally acclaimed as the major place in the world to view the universe. How can we possibly hold that position if we cause the air around that beautiful mountain to become polluted and thick with gases?*

Response: An expanded analysis of the wind direction was performed using approximately ten years of wind data collected at Barking Sands on the island of Kauai. The goal of the analysis was to determine the probability of favorable wind directions that would not carry the rocket plume into the field of view of the observatories. The wind direction is the most important factor in analysis of the total wind field and determines the initial conditions in the transport of the plume. The results of the analysis showed easterly winds (winds from the east) during an east launch to be the direction of primary concern. Data from the higher altitudes (approximately 18 km and above) showed a significant percentage of the wind directions from the east. A copy of the report is attached.

It should be emphasized that the State of Hawaii will *not* allow the viewing integrity of the Mauna Kea observatories to be compromised by a launch facility. It is fully understood that obscuration by plumes is a potentially serious problem for which the currently proposed mitigation is believed to be adequate. In the event that the project moves forward, and refined analysis is carried out, a potential developer would have the option of presenting possible changes in mitigation to UH Institute for Astronomy (IfA) for approval.

Please refer to Appendix C of the FEIS for the report by Engineering-Science, Inc. entitled "Analysis of Stratospheric Wind Data to Determine the Frequency of Winds Toward the Mauna Kea Observatories" which was attached to this response.

Post Office Box 158
Naalehu, Hi, 96772
November 18, 1993

To whom it may concern:

For more than ten years, I have been involved with the study and understanding of the proposed Kau Missile Launching Facility.

My conclusion has been that the proposed facility will have many negative impacts on the local community and environment.

I have questions regarding the following concerns:

A. The placement of launch pads near a major fault
B. Tsunami inundation
C. Variable wind patterns
D. Effects on human lives,wildlife and aquatic life
E. Economic feasability(wether or not there markets)
F. Potential for accidents such as toxic spills and explosions
G. The effect of fallout on potable water supply

Then the question arises regarding the Safety Zone. The DEIS states that the 2.9 miles is safe enough for Pahala. But that is based on the missile being aborted at 500feet or 1000 feet, etc.and the effects of the exploded material and toxic plume on the nearby community and environment.

Secondly, I am concerned by the DBED-T that larger missiles may come later(Japanese H-I Missile). Thus E.I.S. must deal with a new safety zone to accomodate these larger launch vehicles and thus present greater risks with abort at 500, 1000,2000 feet. etc.

These and many other questions must be answered and be honestly addressed to the satisfaction of the people of this state.

(over)

With this in mind, I want to be an intervenor on any contested case hearing which will be called for on the State of Hawaii's proposed Kau Missile Launching facility.

Very truly yours,

Douglas K. Walsh

Douglas K. Walsh

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
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SEP. 30 1994

Mr. Douglas Walsh
P.O. Box 158
Naalehu, HI 96772

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (dEIS)-
CONCEPTUAL PLAN FOR A COMMERCIAL SATELLITE
LAUNCHING FACILITY AT PALIMA POINT, KA'U, HAWAII

Dear Mr. Walsh:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed. Point-by-point responses to your specific comments are attached.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed —and the efficacy of the mitigating measures presented—is left to be determined by legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions.

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement—which would be the responsibility of the private developer—and various licenses, permits, and agreements with state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Attachments

12-498

ACTA, Inc., and Risk Science Associates contributed to the following responses:

Comment: *Concern regarding the placement of launch pads near a major fault.*

Response: Geologic hazards are discussed in Volume I, Chapters 3 and 4, and indepth in Appendix IIIA. The purpose of the dEIS is to assess the hazards in a preliminary manner and provide suggestions of possible mitigations. It is beyond the scope of this work to provide more detailed analyses and recommendations regarding construction and implementation of actual mitigations. Such analyses are appropriate if the site were deemed appropriate for the proposed development and work progresses into actual planning and construction.

If the project reaches the point that actual design and construction would begin, several years of continued research in earthquake engineering will have occurred—seismic isolation for large structures is an active area of research that recently received a major test during the 17 January 1994 Northridge earthquake. Thus, it is likely that such designs, which have already been implemented in a number of structures throughout the U.S. and Japan, will have been evaluated and tested sufficiently to be of use in further analyses. A careful engineering seismic risk analysis is specifically recommended in Appendix IIIA (page 19, paragraph 5):

> *"A complete and comprehensive seismic risk analysis is recommended as a means of qualifying and systematically evaluating seismic risks and mitigation alternatives. Such an approach requires detailed risk modeling and analysis which is beyond the scope of this report. A complete seismic risk analysis must be based on a detailed design of the facility, which begins with the specification of seismic design criteria as suggested herein. Facility layout and design-type mitigations are employed during the design phase to limit earthquake-related risks. Additional risk mitigation opportunities are available in the specification of normal and emergency operating procedures."*

Comment: *Concern regarding tsunami inundation.*

Response: Figure III-2.5 on page 3-31 of Volume I depicts the estimated tsunami inundation zone. As noted, only a small portion of the pad 3 area is within the tsunami inundation zone. The launch pad structure itself would not occupy the launch pad area as shown on the map, however, the perimeter may include a road or a gatehouse. The Conceptual Project Description (DBEDT, 1993) and the dEIS recommend that the launch structures be located in areas of at least 60 feet elevation, outside of the tsunami inundation zone. A rocket launch pad is typically elevated somewhat above grade on a large, usually reinforced concrete, foundation. Typical tsunami damage occurs by the strong hydrodynamic forces during the inundation and

draw-down of the water which erodes the foundations of buildings and may cause additional damage by impact of objects, such as trees, boulders, vehicles, parts of structures, torn loose and thrust against erect buildings. The large foundation of the launch pad could be designed to rise above the maximum credible tsunami run-up level, and be strongly anchored to bedrock (basalt lava flows) to avoid erosion at its base. More vulnerable parts of the launch pad would then be elevated above the potential tsunami run-up and the massive foundation would resist the hydrodynamic forces of the inundation. Corrosion effects of the salt water inundation would be resisted by the regular maintenance procedures of a facility erected along the sea coast where salt spray is an ever-present corrosive agent.

Comment: *Concern regarding variable wind patterns.*

Response: The dEIS acknowledges that site specific meteorological data was limited and that the certain aspects of spaceport hazards analyses cannot be fully addressed unless, and until, an on-site meteorological data collection program is implemented. DBEDT's consultant, ACTA, has experience with operating the toxic dispersion models for literally thousands of meteorological balloon soundings for Cape Canaveral Air Station, Vandenberg AFB, and Edwards AFB. This experience has given ACTA insight into the meteorological patterns which typically result in the most unfavorable toxic dispersion conditions.

The seven atmospheric soundings used as a basis to analyze the dispersion of rocket exhaust plumes and abort clouds were intended to cover the range of the most prevalent weather patterns expected to occur in the Palima area. When examining the feasibility of a spaceport operation and its potential impacts on the environment and local population, it is reasonable and prudent to examine the range of meteorological conditions which apply to the area. The existence and documentation of "best case" scenarios indicates that there are certain weather patterns which are favorable to safe launch conditions and this information is of value to potential customers of an economically viable space launch operation. Likewise, every effort was made to understand the unfavorable aspects of the Palima meteorology in order to define a "reasonable worst case scenario" for assessing the health risks associated with potential launch aborts and accidental spills. Determination of these conditions involved further conversations between ACTA analysts and Dr. Thomas Schroeder, a meteorologist at the University of Hawaii, as well as review of other publications pertaining to meteorological studies on the island of Hawaii.

As a result of these considerations, a hypothetical worst case meteorological data set was defined for use in the toxic dispersion analyses. Appendix VID pages 2-1 through 2-4 and pages 4-1 through 4-11, present a description of the important meteorological features which affect the rise, stabilization, and dispersion of exhaust plumes. The "worst case Kona" weather condition was defined with the following features:

- Base of the persistent tradewind inversion was lowered to 5000 feet from 6360 to represent a lower "trapping lid" beneath which the rocket exhaust gases are trapped and disperse back to the ground level.

- Winds at all elevations were oriented in the same direction thereby eliminating the enhanced gas dispersion attributable to wind shear.

Both of these modifications result in conditions which limit the dispersion rate of the rocket exhaust and result in increased ground level concentration predictions. A further "worst case" condition was added to the toxic hazard analysis by assuming that the wind direction on any given day could direct the exhaust cloud directly toward any of the 66 sensitive receptor points identified by the State of Hawaii. The maximum concentration exposure levels for these worst case weather and plume travel scenarios were documented and tabulated in Appendix D for each possible vehicle abort mode and each chemical species of concern and applied to the candidate launch vehicle containing the largest quantities of both liquid and solid propellants (Delta II 7925). The human health risk assessment (Appendix VIIIA, page 2-2 and page 6-4) and ecological risk assessment (Appendix VIIIB, pages 3-11 to 3-13) conducted by Risk Science Associates also included evaluation of hazard indices based on exposure levels derived from these worst case scenarios.

The meteorological conditions applied to predict toxic gas dispersion from accidental spills of liquid propellants which evaporate from pools without combustion were also modeled over a range of wind speeds, atmospheric stabilities, wetted pool areas and inversion heights in order to identify the conditions which result in the largest toxic hazard corridors. Once again the assumption was made that the surface winds transporting the hazardous gas could travel in any direction and concentrations at the 66 sensitive receptor sites were calculated assuming the plume travel from the spill site directly toward the receptor. The conservative nature of these modelling assumptions and the expectation that these scenarios would have a high probability of not underestimating the toxic hazard are addressed in more detail in Appendix VID, pages 5-1 to 5-3. The maximum spill quantities for the hypergolic liquids were based on 728 gallons of nitrogen tetroxide and 615 gallons of Aerozine-50 which represent the total Stage 2 tankage of a fully fueled Delta II launch vehicle. These spill quantities combined with the worst case weather conditions are deemed to represent worst case scenarios and they far exceed the accidental releases of liquid propellants which have been experienced in thousands of propellant transfers at the mainland launch facilities.

In summary, it should be stated that during actual operations of the Palima space port the facility would be equipped with an array of weather sensors which would allow the actual meteorological conditions to be monitored in order to support the safe operation of the launch facility. The range safety section of Volume I on page 2-14 states: *"Prior to launch, surface and upper atmosphere winds are monitored to determine whether or not it is safe to fuel and launch the rocket. Air quality and meteorological measurements are conducted continuously to*

ensure rapid detection and response to elevated levels of hazardous vapors." This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would also be required to comply with federal and state emergency preparedness and hazardous materials handling requirements as described in Volume I page 5-136 section 3.0 entitled, "Emergency Response Capabilities".

Comment: *Concern regarding effects on human lives, wildlife, and aquatic life.*

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the Health Risk Assessment, *"Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures."* The health risk assessment uses algorithms described in EPA methodology that are *"conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."*

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Comment: *Concern regarding the economic feasibility (whether or not there is a sufficient market).*

Response: The dEIS economic forecasts are based on a conceptual plan that includes launch rate assumptions. The launch rate assumptions are based on scheduling, capacity, and economic feasibility. Estimates of the number of launches necessary to make the spaceport economically viable range from 12 to 22 per year. As you correctly observed, this exceeds the estimated number of available launches, according to recent market projections. The commercial market is difficult to forecast, however, as evidenced by recent proposals that include launching over 850 communications satellites into low earth orbit.

It is possible that future projects could create enough demand to require additional launch capacity. The spaceport would be built by a private interest (possibly an international consortium), and not the state or federal government. The issues of economic viability and the market would be thoroughly researched in the context of a real project (not simply a conceptual plan) before private investment capital would be committed. The spaceport would not be built if private investors were not convinced that the commercial launch market was sufficiently robust to generate the desired rate of return on their money.

Comment: *Concern regarding the potential for accidents such as toxic spills and explosions.*

Response: The potential effects to both humans and the ecology resulting from accidents such as toxic releases and launch failures are thoroughly described in the two risk assessment documents included in the dEIS as Appendices VIIIA and VIIIB, and condensed in Volumes I and II. The health risk assessment concluded that the risks for normal successful launches and abnormal launch failures were negligible. As noted above, health risks from on and off site accidental spills that are not immediately remediated could be significant.

The actual risks to ecosystems from all activities associated with the facility is actually quite low. Potential adverse impacts from chemical pollution from launches, the threat of spills or other accidental releases, and the possibility of releases caused by natural disaster are all addressed within the ten volumes of the dEIS.

Comment: *Concern regarding the effect of fallout on potable water supply.*

Response: We do not know what you mean by "fallout". For the purpose of this response we will assume you are referring to deposition of emissions following a launch. The health risk assessment in Volume VIIIA discusses the risks due to the deposition of launch (normal and unsuccessful) combustion products into rain catchment systems used for drinking water. In all the cases modeled, the maximum overall acute hazard indices at Pahala and Punalu'u are both less than 1.0. This is considered insignificant and indicates that acute adverse health effects are not expected to occur via this exposure pathway.

Comment: *The dEIS states that the 2.9 miles is safe enough for Pahala. But that is based on the missile being aborted at 500 feet or 1000 feet, etc., and the effects of the exploded material and toxic plume on the nearby community and environment. I am concerned by the DBEDT that larger missiles may come later (Japanes H-1 missile). Thus, the EIS must deal with a new safety zone to accommodate these larger launch vehicles and thus present greater risks with abort at 500, 1000, 2000 feet, etc. These and many other questions must be answered and be honestly addressed to the satisfaction of the people of this state.*

Response: We disagree with your statement that "the dEIS states that the 2.9 miles is safe enough for Pahala." Rather, as stated above, the Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant. Although this may be true for other vehicles as well, these analyses are only relevant to the vehicles assessed in the dEIS.

If a specific project is proposed in the future, supplemental environmental analyses would be required for the vehicle(s) to be launched. The State has no interest or intent to increase the size of the Population Control Zone.

Launch failures can produce solid debris, as well as liquid and vapors. The solid debris is contained by the Range Safety System to land within the Impact Limit Line or in the ocean. The liquid propellants can disperse in a cloud that is potentially toxic. Part of the preflight activity is to determine whether the wind will blow any toxic cloud in a direction that can be harmful to anyone in the surrounding community. The launch can be held on the basis of the potential hazard to the community.

The debris impact analyses performed by ACTA were intended to give a general idea of where debris would fall for both southern and eastern launches. At the mainland ranges, which have been operational for many years, there are well defined safety corridors bounded by what are called destruct limit lines. During a launch the projected debris impact positions are monitored and if the projected debris pattern crosses the destruct limit line from the safe corridor into the unsafe area, the missile flight control officer destroys the launch vehicle. The guidance systems of correctly functioning rockets are able to carefully steer the vehicle along a preprogrammed trajectory and the destruct limit lines are only violated if there is a launch vehicle failure which causes the rocket to lose steering control. The destruct limit lines which might be applied to a Palima Point launch facility have not yet been defined but would be by the time actual launches commenced. Protection of public health and property are prime considerations in defining the destruct limit lines. Protection of critical turtle nesting areas could also be a consideration when selecting appropriate destruct limit lines.

Day of launch forecasted wind patterns are used to predict the debris patterns during actual launch operations. Most of the solid propellant fragments are expected to be fairly large and compact giving them a high ballistic coefficient. Fragments with high ballistic coefficients are quite insensitive to the prevailing wind conditions, hence their impact locations are governed by the velocity and position of the launch vehicle at the time of vehicle destruct plus the additional random velocity imparted by the vehicle explosion. These factors are all taken into account when computing the debris impact patterns. The science of range safety has evolved to the point that the debris analysis and missile destruct safety systems afford a high probability of maintaining safe operations and the general public should not feel that they are at the mercy of errant rockets. The issues to be resolved in operating the space port are not so

much whether or not safety margins can be achieved, but rather, what level of constraint should be imposed on launch vehicle customers operating from the spaceport.

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Dorothy Wood Date: 11-12-93

Name and address:

Dorothy Wood
PO Bx 4942
Hilo, Hawaii 96720

Cc:- Department of Business, Economic Develoment and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

- State of Hawaii, OEQC
220 South King St., 4th fl.
Honolulu, HI 96813

12-502

HAWAI'I COUNTY COUNCIL NOVEMBER 1, 1993

COUNTY COUNCIL:

I THANK COUNCILWOMAN HELENE HALE FOR SPONSORING MY REVIEW OF THE DRAFT EIS, IN COMMUNICATION 548:03, AND THE COUNCIL MEMBERS FOR CONSIDERING MY REVIEW CONCERNING A TENANT "THE SPACEPORT PROPOSAL AT PALIMA POINT, HAWAI'I". I WANT TO THANK BOTH OSI, AND DBED/T FOR THEIR PROFESSIONAL CONDUCT WITH ME OVER THE PAST FEW MONTHS.

THE SPACEPORT PROPOSAL IS, IN MY EXPERIENCE AND STUDIED OPINION, AN EXTREMELY RISKY BUSINESS PROPOSITION INVOLVING A RELATIONSHIP BETWEEN LANDLORD AND TENANT, AN AEROSPACE CONSORTIUM, WHOSE CLIENTS REPRESENT HAZARDOUS CHEMICAL AND NUCLEAR FUELS. IF THIS PROPOSAL IS ACCEPTED, IT WOULD LEAVE THE STATE, AT ANY LATER DATE, WITHOUT RECOURSE WITH REGARD TO THE ACTIVITIES OF A NON-EVICTABLE TENANT.

THE TENANT AND HIS CLIENTS REPRESENT SO-CALLED "STATE OF THE ART" ROCKETS: THE DELTA CLIPPER, (A SINGLE STAGE DELTA CLASS VERTICAL TAKE-OFF AND LANDING SPACE VEHICLE), NUCLEAR FUELED PROPULSION ENGINES (TOPAZ 2), AND PAYLOADS SUCH AS RTGS, THE MUCH CONTESTED RADIOISOTOPE THERMALELECTRIC GENERATORS.

THESE SYSTEMS ARE NOT HYPOTHETICAL, BUT READY FOR USE IN THE INVENTORIES OF THE TENANT FOR COMMERCIAL OR SCIENTIFIC SPACE EXPLORATION, AND THE BALLISTIC MISSILE DEFENSE ORGANIZATION. NUCLEAR FUELS ARE CAPABLE OF "SINGLE EVENT MASS DESTRUCTION", AND COULD LAY WASTE THE ISLAND OF HAWAI'I IN THE EVENT OF ROCKET FAILURE. CHEMICAL ROCKETS ARE CAPABLE OF MANY HEALTH RISKS AS WELL, SUCH AS: STRESS, GENETIC TOXICITY, MUTAGENICITY, AND EVEN DEATH. SOME PARENTS AWAITING BIRTH ALREADY SUFFER, FEARING THAT THEIR CHILD MIGHT BE ABNORMAL. OTHERS AGONIZE A LIFE TIME. ENCLOSED IS BRUCE AMES' RESEARCH ON GENETIC TOXICITY.

PAGE 2. HAWAI'I COUNTY COUNCIL. NOV. 1. 1993.

IN BUSINESS THE TENANT HAS NO GUIDE LINES FOR ETHICS

I RESPECTFULLY SUBMIT THAT THIS COMMITTEE OF THE HAWAI'I COUNTY COUNCIL IMMEDIATELY RECEIVE FROM THE GOVERNOR OF THE STATE OF HAWAI'I THAT HE UN-CONDITIONALLY ABANDON THE STATE'S DEIS, AND FOREGO THE FINAL STATE EIS. THIS IS STILL THE ONLY OPPORTUNITY FOR PUBLIC VOICE IN THE ISSUANCE OF THE SPACEPORT LICENSE.

EVEN THOUGH THE SPACEPORT PROPOSAL APPEARS TO BE WINDING DOWN WITH THE WITHDRAWAL OF THE INTENDED TENANT, A CRITICAL PHASE IS STILL MOVING FORWARD, THE DRAFT EIS, WHICH MUST BE TERMINATED. THEREFORE, IT IS WITH GREAT REGRET THAT I SUBMIT THE FOLLOWING ACTION TO THE COUNTY COUNCIL: IF GOVERNOR WAIHEE SHOULD REFUSE TO COMPLETELY ABANDON THE SPACEPORT PROPOSAL, THEN I REQUEST THAT A RESOLUTION BE PREPARED FOR THE HAWAI'I STATE SENATE TO SET A TRIAL FOR IMPEACHMENT OF GOVERNOR JOHN WAIHEE, OR PURSUE WHATEVER OTHER MEANS OF ASSURANCE THAT THE SPACEPORT PROPOSAL IS WITHDRAWN.

I MAKE MYSELF AVAILABLE TO THIS COMMITTEE. I AM READY FOR YOUR QUESTIONS.

SINCERELY,

William F. Hachmeister

WILLIAM FREDERICK HACHMEISTER
I SUPPORT A WORLD-WIDE BAN ON SPACE NUCLEAR POWER.

ENCLOSURE: BRUCE AMES RESEARCH. THE COEVOLUTION QUARTERLY. NO. 21. SPRING 1979.

P.O. Box 10267
Hilo, Hawaii
96720

12-503

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULZ
DIRECTOR
RICK EGGI
DEPUTY DIRECTOR
TAKESHI YOSHINAGA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza 220 South King Street 11th Floor Honolulu Hawaii 96813
Mailing Address P.O. Box 2359 Honolulu Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

SEP. 30 1994

Ms. Dorothy Wood
P.O. Box 4942
Hilo, HI 96720

Dear Ms. Wood:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site (EPA 1989). The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

Use of the RME scenario in the dEIS resulted in significant impacts due to certain activities and accidents and are fully disclosed in the dEIS. "The results of the EIS analyses indicate that the increased lifetime cancer risk and acute adverse health effects in the surrounding community will occur from just one transportation spill of hydrazine and that acute adverse health effects will occur from just one transportation spill of nitrogen tetroxide" (page S-4 of Volume I). Similarly, "The individual cancer risk from just one worst-case on-site spill from a Delta second stage tank is significant" (page S-8 of Volume I).

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-506

c: Kenneth Munechika, DBEDT

SEND COPIES TO APPROPRIATE PARTIES

POSTED

FILE

DECLARATION BY:
William Frederick Hachmeister
P.O. Box 10267
Hilo, Hawai'i 96720

'93 OC 15 [illegible]

IMPORTANT PUBLIC NOTICE CONCERNING THE SPACEPORT PROPOSAL

"HE WHO IS SILENT IS CONSIDERED AS ASSENTING, WHEN HIS INTEREST IS AT STAKE": the Palima Point spaceport proposal is currently being offered for review to the public. This is your ONLY chance to state your concerns in writing.

LEAVING THE PUBLIC WITHOUT RECOURSE: rule of public disclosure concerning nuclear fueled rockets does not apply to the State draft environment impact statement, since State of Hawai'i's law, Act 172, already prohibits nuclear fuels on launch vehicles. On the contrary the Federal Government does not have to comply with Hawai'i State law. Any Federal agency can use nuclear fuels on rockets or space-probes at any future date. Further, the State does not have an instrument of contract concerning the spaceport operation, launch restraints and constraints, and liabilities. Only a letter of intent from Lockheed Corporation.

NEWLY DEVELOPED "STATE OF THE ART" NUCLEAR PROPULSION (THERMIONIC) ROCKETS: nuclear propulsion rockets do exist! Thermionic performance is by far greater then that of chemical rockets that are contentiously fading into history. Thermionics provide speed and payload lift abilities that are considered important for the planetary expeditions, and are being adapted to the Ballistic Missile Defense projects. QUIETLY purchased from Russia by our government in 1991, the Bush Administration intentionally limited the public's awareness of the purchase, as reported by The Washington Post, Aviation Week and Space Technology, Christian Science Monitor, and The Wall Street Journal.

IRREPARABLE HAZARDS OF NUCLEAR FUELED ROCKETS: a thermionic rocket is capable of vaporizing and releasing considerable amounts of lethal nuclear fuels, or exploding with a force many times greater than that of Hiroshima. A single malfunction could leave the Island of Hawai'i, probably all the Hawaiian Islands uninhabitable for thousands of years. Nuclear rockets carry hundreds of pounds of PLUTONIUM or URANIUM, whereas the bomb that destroyed Hiroshima required only 2.2 pounds of plutonium, in the historical single event that ended world war II, and continues to be a major health hazard to this day.

ETHICAL VIOLATIONS INVOLVING NASA AND NUCLEAR FUELED SPACE-PROBES: "Sometimes it takes a cowboy". in 1989 I enjoined the Christic Institute's litigation to halt the launch of the NASA space shuttle Atlantis that was carrying the nuclear fueled space-probe Galileo. I gave expert testimony that my ex-employer Teledyne had provided faulty flight computers critical to the shuttle system. The Pentagon and Department of Justice had received guilty pleas, and trial convictions of Teledyne procurement executives. Therefore, significant proof was available to the judge hearing our litigation that should have ruled in our favor and halted the NASA mission. However, our motion was denied and the Launch continued. The following year the nuclear fueled space-probe Ulysses went through a similar challenge, and that litigation also failed. Twice the people of Florida were without recourse except to live in fear of a failed launch that was capable of a single event mass destruction greater than that of Hiroshima. Since 1989 Teledyne Relay's has pleaded guilty, fined, and banned from Pentagon contracts.

THE AMERICAN LAW: Qui tacet consentire videtur, ubi tractatur ejus commodo; "He who is silent is considered as assenting, when his interest is at stake".

BEFORE THE SPACEPORT PROPOSAL CAN BE STOPPED A MAJORITY OF THE PUBLIC MUST REACT NEGATIVELY IN WRITING. SEIZE THIS EXTREMELY VALUABLE OPPORTUNITY TO REPLY. DEMAND THE TRUTH AND ANSWERS TO THESE EXTREMELY CRITICAL QUESTIONS.

NEGATIVE LAND VALUES (Land Economics Feb. 1991 v67 n1 p30(7)): Hawai'i must not apply for a spaceport license from the United States Department of Transportation. Once the license is granted, we are without recourse in matters of nuclear material storage and usage. Economic researchers have found that a significant negative effect occurs on the financial value of agricultural land in the proximity of nuclear reactors (foot note (1)). I agree with members of the Hawai'i County Council and their deferring RESOLUTION 102 93 that demands the State withdraw the spaceport proposal.

THE CHOICE IS YOURS: the State of Hawai'i refuses to address these critical nuclear issues, by simply referring these issues to the Federal Environmental Impact Statement which occurs after the issuance of the license. Therefore, we the people have only one opportunity to make our feelings known. Inform your family and friends; respond to this public notice. Your written statement (optional) is also important for decision makers. Respond by mail to me or to:

Office of Environmental Quality Control, 220 South King Street, Suite 400, Honolulu, Hawaii, 96813.

My signature supports and demands the withdrawal of the spaceport proposal:

NAME	SOCIAL SECURITY	ADDRESS	TELEPHONE
Richard J. Fairchild	189-28-8293	Box 39045, K.K. HI 96739	929-9632 326-2388

SIGNATURE [signature]

SIGNATURE _____

SIGNATURE _____

TIME IS OF THE ESSENCE: carefully consider the facts, and discuss these issues with your family and friends. If you feel the same as I and others do then your reply must be mailed immediately. Further, I suggest you xerox this form for others to respond. We must have the majority of the population to make a difference.

Mahalo Nui Loa,

William F. Hachmeister

William Frederick Hachmeister
(ex System Sustain Engineer for Teledyne MicroElectronics on the NASA space shuttle and unmanned launch vehicles).

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

NOV - 4 1994

Mr. Richard J. Fairchild
Box 390451
Kailua-Kona, HI 96739

Dear Mr. Fairchild:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

12-508

Comment: Hawaii must not apply for a spaceport license from the United States Department of Transportation. Once the license is granted, we are without recourse in matters of nuclear material storage and usage. Economic researchers have found that a significant negative effect occurs on the financial value of agricultural land in the proximity of nuclear reactors.

Response: As stated in the dEIS, the State of Hawaii would neither build the spaceport nor apply for an operating license. On the subject of nuclear materials, nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk

assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The health risk assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

FILE 2

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely, Clemente C. Hudson Nov. 18, 1993

Signature: Date:

Name and address:
Clemente C. Hudson
4323 Pilikai Rd.
Anahola, HI. 96703

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-509

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii 96813
Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

NOV - 4 1994

Clemente C. Hudson
4323 Pilikai Road
Analola, HI 96703

Dear Clemente C. Hudson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Michael Johnson Date: Nov. 20, 1993

Name and address:

167 Lahaiha St.
Hilo Hi. 96720

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-511

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

NOV - 4 1994

Mr. Michael Johnson
167 Lahaiha Street
Hilo, HI 96720

Dear Mr. Johnson:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

File

POSTED NOV 22

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Diana Marriott Date: Nov 19/93

Name and address:

1506 Kaunuali St
Hon HI 96817 #328

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-515

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

NOV - 4 1994

Ms. Diana Marriott
1506 Kaunuali St., #328
Honolulu, HI 96817

Dear Ms. Marriott:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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12-516

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

FILE

POSTED NOV 22 1993

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

'93 NOV 24 A11:41

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Anne K Moikeha Date: 11/19/93

Name and address: Anne K Moikeha
802B Kahuna Lane
Honolulu, Hawaii 96826

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-517

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

NOV - 4 1994

Ms. Anne K. Moikeha
802B Kahuna Lane
Honolulu, HI 96826

Dear Ms. Moikeha:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-522

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Date: 11/19/93

Name and address: 94-1054 Paha Pl. Waipahu, Hi. 96795

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-523

POSTED

'93 NOV 24 P1:1

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street 11th Floor Honolulu, Hawaii 96813
Mailing Address P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406 Fax (808) 586-2377

NOV - 4 1994

Resident
94-1054 Paha Place
Waipahu, HI 96815

Dear Resident:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-524

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

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I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature:

Date: Nov 19, 1993.

Name and address:

ELIZABETH SPOONER
159 KAIULANI #310
HON. HI 96815

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-525

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
TAKESHI YOSHIHARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone: (808) 586-2406 Fax: (808) 586-2377

NOV - 4 1993

Ms. Elizabeth Spooner
159 Kaiulani, #310
Honolulu, HI 96815

Dear Ms. Spooner:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-526

FILE

POSTED

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

'93 NOV 24 A11:41

Re: conceptual plan for a 'spaceport' at Palima Point.

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I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: Christine K. Whitney Date: 11/19/93

Name and address:

1860 Ala Moana Blvd #705
Hon. HI. 96815

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-527

JOHN WAIHEE
GOVERNOR
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DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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NOV - 4 1994

Ms. Christine Whitney
1860 Ala Moana Blvd., #705
Honolulu, HI 96815

Dear Ms. Whitney:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

Comment: Insufficient disclosure to the public...concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

Response: Health and ecological hazards and risks are quantitatively evaluated in Volume VIII of the dEIS. The risks reported in the health and ecological risk assessments are maximum values resulting from worst case atmospheric conditions and are based upon an estimation of expected reasonable maximum exposure. As described on page 4-1 of the health risk assessment, "Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. The RME is intended to estimate a conservative exposure case that is within the range of possible exposures." The health risk assessment uses algorithms described in EPA methodology that are "conservative and most likely overestimate the dosages and risk, thus its utility in assuring that the risks are not underestimated."

The Health Risk Assessment concluded that the risks for normal launches and abnormal launch failures were negligible. Health risks from on and off site accidental spills which are not immediately remediated could be significant.

It should be noted that the State Department of Health, in its dEIS comments of December 9, 1993, stated the following:

> *"This is the finest HRA (Health Risk Assessment) to ever be reviewed by the DOH's Hazard Evaluation Office. This DEIS seems to give a very good estimate of the possible health risks involved with the operation of this satellite launch facility."*

Nuclear propulsion systems were not evaluated in the dEIS because they are used only for deep space probes, which require significantly more lift capability than any of the rockets evaluated in the dEIS. The site's size constraints preclude any rocket currently capable of carrying deep space probes from being launched from Palima Point. In addition, as stated on page 2-4 of Volume I of the dEIS, "On June 19, 1990, Act 172 was signed into law by the Governor of the State of Hawaii. Section 201 states that:

> *Any vehicle launched into space from the land or ocean territory of the State shall not carry weapons of destruction, nuclear waste materials, or use radioactive materials as a power source."*

While it is possible that Act 172 could be preempted by federal law to protect national security, defense, foreign policy, or other federal interests, the federal government in fact does not have any record of taking over commercial, privately funded facilities during peacetime. It can be concluded that the likelihood of the federal government taking control of the proposed spaceport and violating Act 172 is a very remote possibility. The national launch ranges already have the infrastructure and launch pads necessary to accommodate all classified payloads and their boosters.

Comment: I support the immediate and total withdrawal from the dEIS process and do not authorize Governor Waihee to continue with this project.

Response: After completion of the EIS, the State of Hawaii does not anticipate further active participation in the launch site initiative at the present time. A supplemental environmental impact statement---which would be the responsibility of the private developer---and various licenses, permits, and agreements with the state, county, and federal agencies would have to be completed before a launch facility could be developed at Palima Point. Development of such a facility by private industry would only occur if driven by sufficient demand for commercial launch services.

Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takeshi Yoshihara

12-528

Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Re: conceptual plan for a 'spaceport' at Palima Point.

Dear Governor, John Waihee,

I protest against the acceptance or the continuance of the 'DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) re above subject for the following reasons:

Insufficient disclosure to the public for their only formal comment concerning the natural environment and the human environment, with health hazards and risks that can be fatal, precisely the nuclear and chemical fuels.

I support the immediate and total withdrawal from the DEIS process and do not authorize Governor John Waihee to continue with this project.

Yours sincerely,

Signature: A. Winterbottom

Date:

Name and address:
#2703-425 South St
Honolulu Hawaii
96813

Cc: Department of Business, Economic Development and Tourism (DBEDT)
attn: Mr. Tak Yoshihara, Deputy Director
P.O. Box 2359
Honolulu, Hawaii 96804

State of Hawaii, Office of Environmental Quality Control
220 South King St., 4th floor
Honolulu, Hawaii 96813

12-529

POSTED

FILE

JOHN WAIHEE
GOVERNOR
JEANNE K. SCHULTZ
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR
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NOV - 4 1994

A. Winterbottom
2703-425 South Street
Honolulu, HI 96813

Dear A. Winterbottom:

Thank you very much for your comments on the subject dEIS. We appreciate the time and effort that review of the document entailed.

Environmental and safety issues were assessed in the dEIS under a maximum capacity build-out scenario for a conceptual project. The acceptability or non-acceptability of the impacts disclosed---and the efficacy of the mitigating measures presented---is left to be determined by the legislative and regulatory bodies and the community. The EIS is intended to provide factual data to be used as the basis for making informed decisions. Responses to your specific comments follow:

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Thank you again for taking the time to comment on the dEIS.

Sincerely,

Takashi Yoshihara

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TYPICAL EMERGENCY RESPONSE PROCEDURES FOR TRANSPORTING AND HANDLING TOXIC LIQUID PROPELLANTS FOR SPACE OPERATIONS

Purpose and Objective

The purpose of this report is to present and discuss a comprehensive list of elements of a contingency plan for responding to acutely toxic chemical releases. The list is not intended to be complete, nor is it intended to serve as a model. If a Hawaii spaceport is developed, the operator and the community would be required to develop a plan that is best suited to circumstances on the island of Hawaii. The scope of this report is to provide the general principals of emergency preparedness to serve as a guide for the preparation of specific action plans, standard operating procedures, and safety policies if a spaceport becomes operational. Planning and preparation are necessary to insure that the response to toxic chemical emergencies is prompt, correct, and effective. Potential injuries and property damage can be significantly reduced if emergency procedures are established and practiced regularly and if adequate resources are available.

Basis for Emergency Response Plan

An emergency response plan, based on thorough hazard analyses, must be developed prior to transporting highly hazardous substances to the proposed Hawaii spaceport, or if there are major modifications of existing transportation and handling procedures. The emergency response plan must be consistent with federal, state, and local regulations and standards. Some of the agencies involved include the US Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the US Department of Transportation (USDOT), the Federal Emergency Management Agency (FEMA), the US Coast Guard, the State of Hawaii Departments of Health, Defense, and Transportation, as well as the Hawaii County Civil Defense Agency, Public Works, Fire and Police Departments.

Large scale emergencies are the responsibility of the launch facility Emergency Coordinator. He or she must coordinate with an emergency committee consisting of a Local Emergency Planning Committee as required under Superfund Amendments and Reauthorization Act (SARA), Title III. The emergency committee develops an emergency response plan (ERP). In developing the ERP, the committee must analyze the types of emergencies that could happen, their relative seriousness, and their relative probability of occurrence. The emergencies to be considered must specifically include releases of chemicals to the environment, as required under SARA, Title III. Once the classes of emergencies have been defined, each must be analyzed as to the resources, equipment, training, and manpower which would be needed for an adequate response.

The actual plan must be operative at two levels. The first level---which should be widely publicized---should be short, and easy to grasp and implement. No one has the time to search through an elaborate document when faced with a pressing emergency. Although detailed plans have their uses for organized emergency groups, for the general public the emergency action most

likely to be taken is to evacuate the area or building. Often, evacuation may be more extensive than is actually required by the particular situation, however, it is safer to take the most conservative approach.

At the second level, all of the groups likely to be involved in the emergency response plan must possess a copy and be familiar with the organization's emergency response manual, which spells out in detail, as simply and as flexibly as possible, the correct response to the classes of emergencies incorporated in the ERP. The ERP should include a staged response - a first-response protocol to ensure the maximum safety of the largest number of persons, with subsequent options to confine the emergency as rapidly as possible - to begin abating the situation and to terminate the problem. Finally, every plan must contain procedures for evaluations of the emergency response to determine both the cause of the problem and the measures needed to prevent similar incidents from reoccurring, and to critique the way it was handled by the personnel involved.

It is always the intent of every organization to prevent emergencies, rather than to abate them, therefore long intervals may pass between incidents. It is essential, however, to include provisions for periodic review and practice in every emergency response plan.

Elements of the Emergency Response Plan

The following elements and types of information could be included in the Hawaii spaceport emergency response plan. The sample outline presented below is taken from the US EPA's *Chemical Emergency Response Preparedness Program, Interim Guidance, 1985*.

SECTION i: EMERGENCY RESPONSE NOTIFICATION SUMMARY

* 24-Hour emergency response hotline telephone numbers
  1. Local numbers to notify area public officials and response personnel
  2. National Response Center

* Essential emergency reporting information including:
  1. Name and telephone number of caller
  2. Location, source, and nature (e.g., leak, fire, explosion) of accidental release
  3. Number of dead or injured
  4. Name of acutely toxic chemical released
  5. Time of release
  6. Type of release (e.g., instantaneous, continuous, intermittent)
  7. Amount of chemical released so far/duration of release
  8. Total amount of chemical that may be released
  9. Present status of chemical (gas, liquid, etc.)
  10. Whether significant amounts of the chemical appear to be entering the atmosphere
  11. Direction of vapor clouds or plumes
  12. Weather conditions
  13. Local terrain conditions

14. Possible health effects/medical emergency information

* Other agencies (with telephone numbers) to notify immediately (e.g., hospitals, Red Cross, CHEMTREC, etc.)

This emergency response notification should be:

* BRIEF - never more than one page in length;
* EASILY ACCESSIBLE - located on the cover or first page of the plan. It should also be repeated at least once inside the plan, in case the cover is torn off; and
* SIMPLE - reporting information and emergency telephone numbers should be kept to a minimum.

SECTION ii: RECORD OF AMENDMENTS

* Change record sheet
  1. Date of change
  2. Recording signature
  3. Page numbers of changes made

SECTION iii: LETTER OF PROMULGATION

* Statement of Plan Authority

SECTION iv: ACKNOWLEDGEMENT

* Identification of plan contributors

SECTION v: TABLE OF CONTENTS

SECTION I: INTRODUCTION

Section I.A: Abbreviations and Definitions

Section I.B: Purpose

This should be a clear statement of when and how the plan is meant to be used. It is appropriate to list those facilities and transportation routes explicitly considered in the plan.

Section I.C: Relationship to Other Plans

All contingency plans which might be employed in the event of an accidental release of an acutely toxic chemical should be listed in this section

Section I.D: Assumptions/Planning Factors

* Geography
* Climate
* Particular characteristics of each facility and the transportation routes for which the plan is intended
* On-site details
* Neighboring population

Section I.E: Concept of the Operations

This section should include a comprehensive description of the operations procedures, equipment descriptions, and maintenance and inspection measures.

It is anticipated that at least one Safety Representative would be in attendance at all hazardous operations to provide a go-to-proceed with the operation until the end of the hazard. Safety Representatives are required to assure that safety and health hazards are minimized prior to and during all operations. Safety Representatives work closely with operational, engineering, fire, medical, and maintenance personnel to assure compliance with safety and health standards.

A toxic vapor check on drums and cylinders would be performed prior to transport and upon arrival at the designated facility. All transports of acutely toxic propellants would require a security and hazardous materials (hazmat) team escort. All transports would be performed at such a time as to minimize impact to local traffic.

Section I.E.1: Governing Principals

The plan must include brief statements of precisely what is expected to be accomplished if an accident should occur.

Section I.E.2: Organizational Roles

* Chief elected official
* Emergency management coordinator
* Communications personnel
* Fire service
* Law enforcement
* Department of Health
* Department of Public Works
* Environmental Agency
* County government

As stated on pages 5-54 and 5-55 in Volume I, emergency and contingency measures must be developed in coordination with the State of Hawaii Department of Defense, the Hawaii County Civil Defense and other interested agencies

SECTION II: EMERGENCY RESPONSE OPERATIONS

Section II.A: Notification of Release (same as Section i)

Section II.B: Initiation of Action

* Name of on-scene authority
* Method of establishing command post and communications network for response team(s)
* Method for activating emergency response teams
* List of priorities for response actions
* Method for alerting the public
  1. Title and phone number of person responsible for alerting the public as soon as word of the accident is received.
  2. List of essential data to be passed on (e.g., health hazards, precautions for personal protection, evacuation routes and shelters, hospitals to be used)

Section II.C: Coordination of Decision Making

* Lead organization
* Chain of command

Section II.D: Public Information/Community Relations

* Method for keeping the public informed
  1. Provision for one person to serve as liaison to the public
  2. List of radio and TV contacts

The system should be able to rapidly activate such things as sirens, pagers, tone-alerts, traffic-altering signs and car radios.

As recommended by the Hawaii Department of Defense, *"the warning program should consider, among the options available, a siren alerting system purchased and installed by the developer, along the prescribed route or mobile units with public address capability, procured by the developer, to notify persons to evacuate to a safe distance in the event of a serious accident. In all cases, the developer must provide educational programs about evacuation procedures."*

In its *Community Emergency Notification Report and Recommendations*, the California Contra Costa County has made the following system design recommendations:

* All risk systems to deal with earthquakes, floods, fires and chemical releases
* The system should have state-of-the-art emergency response and reaction capabilities.
* It should provide for the rapid, secure deployments of emergency management personnel to the scene of an incident

* It should alert and notify the public of emergency conditions and of appropriate responses expected of them.
* The initial development should focus on areas of the county that pose the most risk to the public.
* Industrial facilities having sirens should be capable of alerting the population out to a distance of approximately one mile. This is the population that could be immediately affected by a toxic release and needs to be alerted first.
* The siren system must be easily tested and maintained. It should have self-diagnostic capability.
* The sound produced by the siren must be unique so it is not confused with the sound of police, ambulance or fire sirens or industrial signals.
* Generally, the siren system should be activated by government authorities after consultation with the affected industrial facility.

Section II.E: Personal Protection/Evacuation

* Chemical-specific personal protection plan
* Name of person who can order an evacuation
* Risk zones where evacuation could be necessary and a method for notifying these places
* Methods for controlling traffic flow
* Shelter locations and other provisions for evacuations (special assistance for hospitals, etc.)

The plan should clearly identify under what circumstances evacuation would be appropriate and necessary. Plans must also be made for communicating specific personal protection information to the community. For example, for some chemicals it is safer to keep citizens inside with doors and windows closed rather than evacuate. Provision must be made for quickly moving traffic out of the risk zone. If schools or other facilities with sensitive populations are located in the risk zone, the plan must identify the relocation area for the evacuees.

Section II.F: Resource Management

* List of personnel, vehicles, and equipment needed for emergency response

Section II.G: Personnel Safety

* Standard order of procedure for entering and leaving sites
* Accountability for personnel entering and leaving hazardous site
* Recommended safety equipment
* Personal safety precautions

Section II.H: Acutely Toxic Chemicals

* CHEMTREC (Chemical Transportation Emergency Center) Phone Number
* List of appropriate data for acutely toxic chemicals

Section II.I: Countermeasure

* Exposure assessment
* Containment and mitigation actions
* Cleanup methods
* Restoration of the surrounding environment

It is critical to monitor the release and assess its impact. It is important to determine whether a fire should be extinguished or allowed to burn itself out. Water used in firefighting could become contaminated and need to be contained. Some vapors may condense into pools of liquid which must be contained and removed. Accumulated pools may be recovered with appropriate pumps, hoses, and storage containers. Various foams may be used to reduce vapor generation rates. Water spray or fog may be applied at downwind points away from "cold" spills to absorb vapors and/or accelerate their dispersal into the atmosphere. Volatile liquids might be diluted or neutralized.

If the vapor comes to the ground on crops, or playgrounds, in drinking water, or other places where humans are likely to be affected by it, the area should be tested for contamination. Appropriate steps must be taken if animals are in contact with the chemical. It is important to identify in advance what instruments and methods can be used to detect the chemicals in question.

Section II.J: Response Action Checklist

Section II.K: Attachments

Exact printed directions should be readily available for immediate use in an emergency.

Section II.K.1: Emergency Assistance Telephone Roster

* List of telephone numbers for participating agencies, technical and response personnel, public and private support groups, and CHEMTREC

Section II.K.2: Siren Coverage

Section II.K.3: Emergency Broadcast System Messages

Section II.K.4: Evacuation Routes

Section II.K.5: Traffic Control Points

Section II.K.6: Access Control Points

Section II.K.7: Evacuation Routes for Special Populations

In an evacuation of schools, hospitals, nursing homes, and homes of the physically and mentally disabled will require special attention. Maps should indicate precise routes to another location where special populations can be taken during an emergency evacuation, and methods of transportation during the evacuation.

APPENDIX A: Basic Support Documents

Appendix A.1: Legal Authority and Responsibility for Responding

If there are laws regarding contingency planning for emergency response to acutely toxic chemical releases, they are identified here.

Appendix A.2: Acutely Toxic Chemicals Information

This section should provide technical support information on acutely toxic chemicals. Some could simply include various hazardous materials publications, including EPA's chemical profiles. Technical information such as chemical and physical properties, toxicity, measurement techniques, recommended firefighting techniques, response personnel safety data, general public safety data, and first aid procedures are to be included.

Appendix A.3: Hazards Identification and Analysis

This analysis is a crucial aspect of the planning process. It consists of determining where hazards are likely to exist, what places would most likely be adversely affected, and what acutely toxic chemicals could be involved.

Appendix A.4: Response Organization Structure/Coordination

* Specialized response organization
* How to use outside resources
* Predetermined arrangements

This appendix should also indicate where other disaster assistance can be obtained from federal, state, or regional sources. Provisions should be made for coordinating with other contingency plans and the local civil defense disaster plan. Any coordination with outside agencies should be formalized through mutual aid agreements or memoranda of understanding specifying delegations of authority, responsibility, and duties.

Appendix A.5: Laboratory, Consultant, and Other Technical Support Resources

* Telephone directory of technical support services

Appendix A.6: Computer Utilization

* Available software for the planning process and response capability.

Computers can be very valuable for storing and retrieving large volumes of data, accessing data bases, estimating evacuation or hazard zones, keeping track of the overall planning process, and on-scene capabilities to predict wind dispersion of a chemical. Word processing capabilities can facilitate plan preparation, updates, and distribution.

APPENDIX B: POST-EMERGENCY OPERATIONS

* List of required reports
* Reasons for requiring the reports
* Format for the reports

This appendix indicates what information should be gathered about the release of the chemical and the response operation. Key response personnel could be instructed to maintain an accurate log of their activities.

Appendix B.2: Investigative Follow-Up

* Methods for determining whether the response mechanism worked properly

APPENDIX C: ADMINISTRATIVE AND OTHER SUPPORT DOCUMENTATION

Appendix C.1: Plan Distribution

The entire plan should be available to the public; it can be stored at a library, the local emergency response office, or some other public place. Individual sections of the plan should be distributed to all persons responsible for response operations. The plan distribution list should account for all organizations receiving such copies of the plan. This information is essential when determining who should be sent revisions and updates to the plan.

Appendix C.2: Procedures for Changing or Updating the Plan

* Title and organization of responsible person(s)
* Change notification procedures
* Change frequency

Appendix C.3: Exercises

* Provision for regular tabletop and field simulation exercises

Exercises or drills are an important tool in keeping a plan functionally up to date. These are simulated accidental releases where emergency response personnel act out their duties.

Planners should work with local facilities when conducting simulation exercises. In addition, the public should be involved or at least informed of these exercises. EPA also provides guidance on simulation exercises through its training programs.

Appendix C.4: Training Requirements

* Required training for response personnel
* Courses, seminars, workshops that are required or recommended; include only those available to local response personnel

Training is available from the federal government (e.g., EPA, FEMA, and the US Coast Guard). States may consult with federal regional offices for additional training and assistance. In addition to government agencies, consult universities or community colleges (especially any fire science curriculum courses), industry associations, the National Fire Protection Association, and private firms. Many training films and slide presentations can be borrowed or rented at little cost. Many chemical companies and carriers provide some level of training for free.

In addition to classroom training, response personnel will need hands-on experience with equipment to be used during an emergency.

Appendix C.5: Technical Library

* List of references and their availability

This guidance document lists some planning resources and how to acquire them. It is important for planners to acquire and understand available hazardous substances data bases.

Conclusion

Every facility involved with acutely hazardous substances must be operated in such a manner as to minimize the chances of any incident such as fire, explosion, or release of a toxic substance into the environment or which could endanger human life. A highly trained hazmat team must be available 24 hours a day to respond to emergencies. Planning for such emergencies must take place even though it is intended that no emergency response will ever be needed. Communications are a vital part of any emergency system. Provision must be made for emergency alarms, and ready access must be available to either a telephone or a two-way radio system (plus a back-up system in the event of failure) to summon emergency help from appropriate agencies. Another important step in preparing for an emergency is acquiring appropriate equipment, which is kept readily available for use. Continuous safety monitoring is required for operations where, in the event of an emergency, corrective measures can be enhanced by the actions of emergency personnel.

While the goal of the process design is to avoid the consequences of a hazardous release, inevitably there will be some risk. Safety equipment and emergency procedures are intended to mitigate this risk. A complete and comprehensive transportation risk analysis is a means of

quantifying and systematically evaluating transportation risks and mitigation alternatives. Because preliminary hazard assessments for the Hawaii spaceport identified the transportation of hazardous materials as having potential for posing the highest risk to offsite populations, the comprehensive transportation risk assessment will serve as a benchmark for defining the level of risk which may be considered acceptable. Although every safety precaution shall be taken, evacuation of areas along the transport route between Hilo and Palima Point may be necessary in the event of an accident involving the transport of hazardous materials. Because there is only a single roadway, diversion of traffic to an alternate route is not possible except for the areas immediately adjacent to Hilo.

In the event of an accident, the only viable evacuation option is to move persons to a safe distance away from the accident site along Route 11. The safe distance will be determined as part of the thorough hazard analyses, as it is a function of the type and quantity of material involved in the accident. To minimize the evacuation effort, transport of hazardous materials should be restricted to non-peak daylight hours and should be subject to an advisory permitting process so that emergency coordinating agencies would be available (or on a stand-by status) in the event of an emergency. This would be between 9:00 AM and 3:00 PM. Transport during these hours would preclude problems associated with having to awaken a sleeping community for evacuation and would be a time during which personnel would be available. Transport of material during this time period would also avoid peak traffic periods during which congestion may occur even without an emergency.

MAJOR ELEMENTS OF METEOROLOGICAL MONITORING TO SUPPORT SPACE LAUNCH OPERATIONS

Weather data is used at many stages during launch vehicle processing to protect off-site populations, achieve personnel safety, and to protect man-made assets and environmentally sensitive areas. The primary components of the weather monitoring system are: instruments in the field, a centralized processing facility, and oversight of the system performance by qualified staff meteorologists.

This report describes the specific components of weather monitoring systems used to support space launch operations at the national ranges. The actual components of weather systems used at Vandenberg Air Force Base (VAFB) and Cape Canaveral Air Force Station (CCAFS) are not of primary importance and will not, in all probability, be replicated at a Hawaii launch site. Rather, it is more important to understand what type of information is gathered, how often the information is updated, and how the information is used. If a Hawaii launch site is developed, the meteorological monitoring systems will be designed with these goals in mind. The purpose of this report is to give the reader an overview of the extensive meteorological monitoring functions that are employed for safety and operational considerations. The vast array of weather sensoring equipment assures that the data collected is accurate when verified by comparison with other sources.

Meteorological monitoring to support space launch operations takes place with both surface and upper air observation systems. The specific observations made and the equipment used vary with location. For surface weather conditions, observations are made of wind speed and direction, temperature, humidity, cloud height, and precipitation. Upper air observations are made in the atmospheric layer extending from the surface to an altitude of approximately 300,000 feet. These observations involve the use of balloons, rockets, and radiosondes, as required, to collect raw data such as azimuth, elevation, range, temperature, humidity, and pressure.

Both VAFB and CCAFS monitor surface wind and temperature conditions 24 hours a day using a system of weather towers and acoustic sounders which are positioned at various locations around the base. Range Safety has access to the processed tower data via a computer graphic display system which updates every 10 minutes to display the current wind conditions. During the 24 hours prior to a scheduled launch, an increased number of upper air soundings are performed beyond the routine twice daily soundings. These upper air soundings provide information to the launch vehicle operator for decision making on vehicle steering commands, fuel loading, roll back of the service tower, etc. Range Safety also uses this information to conduct prelaunch analyses of Blast overpressure, rocket debris hazards, and toxic dispersion hazards associated with the launch vehicle. Often the range safety hazards analyses are based on forecasted weather conditions which are generated by the duty forecaster for the time of launch.

Certain new weather monitoring technologies that are becoming available to the ranges are not described in this document. These include NEXRAD radar, weather satellite imagery, and radar wind profilers.

Base Weather Station (BWS)

The BWS serves as the central point of weather data acquisition and processing systems. The center operates 24 hours every day to meet the collective needs for operations that may be hazardous or limited due to meteorological conditions. The BWS at VAFB is supported by 60 staff meteorologists.

Weather Information Network and Display System (WINDS)

The purpose of WINDS is to gather data from wind measurement systems and to process and relay the data to the BWS central processing computer. Forecasters can obtain observed and forecast tower data at specific weather tower locations for wind diffusion predictions and speed-of-sound plots. The WIND systems that collect data include:

* Weather Towers: measurements from 12 to 500 feet
* Doppler Acoustic Sounding System (DASS): measurements from ground level to 1,600 feet
* Meteorological Sounding System (MSS): measurements from 500 to 300,000 feet (which include elevations of concern to the astronomical observatories on Mauna Kea)

Weather Towers

At VAFB, the weather tower system is a multiprocessor system interfaced to 29 remote WIND sites. CCAFS and Kennedy Space Center have a combined total of 50 sensor towers ranging in height from 30 to 500 feet. The towers are located near fuel storage areas, tracking, and launch pads to enable monitoring of operational constraints and safety criteria for wind sensitive operations. Data from the entire network is continuously digitized at each remote site for transmission, processing, quality control, display, and archiving. Data from selected towers is provided to the launch control center. Data is also forwarded for use in engineering studies and climatological analyses required to support range users (the vehicle processors and launchers). Meteorological data for the entire range is processed each minute.

The weather tower system is divided into three basic parts:

1. The remote Meteorological Data Acquisition Terminal (MDAT)

2. The Central Data Acquisition Processor System (CDAPS), and

3. Dedicated receiver/transmitter (R/T) modules

The MDAT system is designed specifically for use in remote environmental monitoring applications. Raw weather information is converted to digital information which is processed by MDAT. The MDAT system employs a one-second sampling rate to gather and process raw data. Each minute, processed data is then transmitted through a modem link to the Central Data Acquisition Processor System (CDAPS).

CDAPS is the interface microprocessor system which collects meteorological data from the remote MDATs for the central processing computer at the Base Weather Station (BWS). The CDAPS transmits each minute an entire block of meteorological data representing input data from every sensor on the range to the BWS.

Communication between the CDAPS and each remote MDAT site is accomplished through the use of dedicated receiver/transmitter (R/T) modules. Each R/T module can be used in communicating with any site. The CDAPS system can communicate with up to 40 R/Ts at one time.

Doppler Acoustic Sounding System (DASS)

The DASS wind profile measuring system can monitor wind movement from ground level to 500 meters. The sensor subsystem is composed of three transceiving antennas with supporting electronics. Near-surface wind data is obtained with a three-axis anenometer. The DASS enables continous measurements of the averages and standard deviations of the three wind components, direction and speed for ten altitude intervals between 50 and 500 meters above the ground. Recording and display intervals between two and 30-minute intervals are available. DASS data is displayed in the BWS forecast area.

The Echosonde is another DASS that is used to measure both atmospheric temperature and boundary layer wind profiles remotely. It is capable of measuring quantitative structure parameters and vector wind components from 10 to 1,000 meters.

Meteorological Sounding Systems (MSS)

The MSS tracks two types of expendable balloons and transponders: the rawinsonde and the windsonde. On the East Coast, the range has three MSS's: two at the CCAFS Weather Station and one at the Ascension Weather Station.

The MSS provides range, azimuth and elevation data from the windsonde transponder. The resulting data is processed and transmitted to calculate the direction and speed for clouds of heated toxic effluents from the engines of launch vehicles.

The MSS also tracks the expendable rawinsonde instruments which are carried to altitudes above 100,000 feet by flexible balloons. At CCAFS, Antigua, and Ascension, high altitude observations are made using payloads carried aloft by Super LOKI meteorological rockets. Time, azimuth, elevation and telemetry data are received and recorded by tracking equipment, then transmitted electronically for processing. The processed data includes vertical profiles of the layer-averaged wind processed direction, speed and shear, plus temperature, dewpoint, pressure, and relative indicies of refraction.

Applications of upper atmospheric observations at VAFB include climatological studies for vehicle design, rocket flight evaluations, and metric data reduction.

Lightning Location and Protection System (LLPS)

The LLPS monitors atmospheric electrical field potential. An Advanced Lightning Detection Finder (ALDF) automatically detects more than 90 percent of all cloud-to-ground lightning occurring within its range. When a flash is detected, the ALDF measures the bearing angle to the ground strike point, and transmits this angle to the position analyzer. The position analyzer then uses the data from two or more ADLFs and their known locations to calculate the location of the flash.

The LLPS enables the following of storm motion and predicting of possible lightning activity for sensitive sites such as the launch pad areas, thus allowing the evacuation of an affected area if required.

Weather Image Recorder

The ALDEN Weather Image Recorder, Geosynchronous Operational Environmental Satellite (GOES) Photo Recorder is a stand-alone recorder designed to receive satellite imagery from the various sources of GOES data. It provides photographic-quality hard copy on either paper or film requiring no subsequent chemical processing, using a unique combination of advanced digital computer technology and laser optics.

MIDDS/GOES

The MIDDS/GOES system takes real-time geostationary weather satellite data from an FAA weather circuit and conventional weather data from local systems and various off-range agencies and facilities. Four individually buffered sets of GOES are sent to a computer at the forecaster workstation in the Base Weather Station. The MIDDS/GOES also receives data from other bases via satellite and is displayed in the form of grid maps and other weather information at the forecaster workstation.

WIND Profiler

The WIND Profiler system consists of two separate units: the Profiler and the Microhub. The Profiler is a clear-air Doppler radar that measures the horizontal winds above the radar. It differs from conventional microwave weather radars in that it does not rely on hydrometeors as targets and it typically scans in only a few directions.

The Microhub is a stand-alone display station which is capable of bringing in data from the Profiler, storing raw and processed data in the database, retrieving and displaying these products, printing out data, and archiving data for display or printout.

Ionospheric System

Radio wave propagation depends on the ionosphere's free ion and free electron structure. This structure changes from day to night, with seasons of the year, with latitude, and with variations in incoming solar radiation. The digital ionospheric sounder located at KSC is used to make radio propagation forecasts that allow the most effective radio communications between specific points to be made. A polarimeter is operated at the Shuttle Landing Facility to measure the total electron count in the ionosphere.

Launch Area Special Systems

This group of systems supports the Range Safety Systems at CCAFS by aiding the forecaster in prediction of lightning activity, atmospheric dispersion of gases that would result from an accidental propellant spill or release of toxic material, rocket exhaust, and prediction of the blast damage that would result from inadvertent detonation of the launch vehicle during launch. While these systems are Range Safety Systems, meteorological data are key to their successful operation.

Meteorological and Range Safety Support (MARRS)

The MARRS system provides real time assessment of toxic material spills. The MARRS system model quickly displays the predicted direction/distance of travel of an accidental toxic/hazardous material spill and the toxic corridor recommended for evacuation of personnel. The system includes a menu of more than 25 CCAFS/KSC storage locations with access to a list of the types and quantities of toxic materials stored at each location. The system supplies the user with displays of local winds and a forecast of the ground-level footprint of a toxic cloud resulting from a hazardous materials release. The MARSS program also provides graphic displays of weather tower data, wind fields, rocket exhaust diffusions, and tabular numeric outputs. Some of the MARSS outputs are similar to those provided by WINDS.

Blast Damage Assessment and Prediction Model

The blast damage assessment prediction model aids safety personnel in assessing potential property damage and casualties in the event of inadvertent detonation of a launch vehicle. The meteorological inputs supplied to the model are pressure, wind, temperature, and dewpoint data obtained from the instrumented wind towers and rawinsondes.

Rocket Exhaust Effluent Diffusion Model (REEDM)

The name of the model used to forecast the diffusion of the rocket exhaust ground cloud. The REEDM computer code includes basic mathematical expressions for atmospheric dispersion models, cloud-rise models, and models for calculating the gravitational deposition of acid droplets from the exhaust cloud. Temperature, potential temperature, wind speed, and wind direction are included in graphic output for easy identification of atmospheric changes.

In closing, it should be stated that a Hawaii spaceport would be equipped with an array of weather sensors which would monitor actual meteorological conditions in order to support the safe operation of the launch facility. This type of meteorological support, coupled with qualified and trained range safety operators, assures that planned operations are conducted only when toxic hazards are minimized and the public's health and safety are not jeopardized. The spaceport would be required to comply with federal and state emergency preparedness and hazardous materials handling requirements as described in Volume I page 5-136 section 3.0 entitled, "Emergency Response Capabilities"

In addition, the science of range safety has evolved to the point that the debris analysis and rocket destruct safety systems afford a high probability of maintaining safe operations, therefore, the general public should not feel that they are at the mercy of errant rockets. The issues to be resolved in operating the spaceport are not so much whether or not safety margins can be achieved, but rather what level of constraint should be imposed on launch vehicle customers operating from the spaceport.

ANALYSIS OF STRATOSPHERIC WIND DATA TO DETERMINE THE FREQUENCY OF WINDS TOWARD THE MAUNA KEA OBSERVATORIES

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BACKGROUND

The Island of Hawaii offers one of the finest astronomical sites in the world with high mountain tops and few sources of air pollution and dust that could obscure observations. Because of the ideal observational characteristics, an international collection of observatories has been located on the Mauna Kea summit. In 1993 an Environmental Impact Statement (EIS) was filed for the possible construction of a commercial space launch facility along the southeast coast of Hawaii. The EIS proposed plume transport criteria that would define acceptable mitigation measures for the transport of the rocket exhaust plumes into the field of view of the observatories. These included no launches when there is a southerly component to the wind at any altitude and launches only when the plume will clear the field of view (above 15° elevation from the horizontal when viewed from the observatories) within two hours after launch. A limited analysis was presented in the EIS indicating the potential for exhaust plumes from launched rockets to enter the field of view of the observatories, however, there was no quantitative analysis of the expected time that favorable launch conditions may exist.

To address the question of how frequently favorable conditions may be present at the launch site, an analysis was performed of wind data collected at Barking Sands on the island of Kauai. The data set consisted of statistical summaries from over 4,000 rocketsonde wind soundings performed from the surface to an altitude of 70 km (~230,000 feet) during the period from 1963 to 1974. This report summarizes the results of the analysis. In interpreting these results it is important to recognize the frequency of favorable conditions does not in itself define the launch constraints. Even if unfavorable wind directions were present, a launch meeting the EIS criteria could take place and still meet the basic criteria of plume clearing if the wind speeds transported the plume out of the field of view within two hours.

ANALYSIS METHODOLOGY

The goal of the analysis was to determine the percentage of time favorable wind directions would be present that would meet the University of Hawaii Institute for Astronomy conditions of not allowing the plume to move above 15° from the horizontal. This is slightly different from the stated mitigation conditions in the EIS indicating no wind directions with a southerly component. The observatories would also be impacted by the plume transport from an east launch when winds are from the east. Therefore, the analysis methodology includes the potential impact to the observatories from wind directions with an easterly component. The data were analyzed in the following manner:

1. Tabulated statistical wind data from the report entitled "Barking Sands, Hawaii, Range Reference Atmosphere 0-70 KM Altitude, December 1983" (RCC, 1983) were entered into computer files. The data included the mean and standard deviation of the horizontal wind components and the correlation coefficient between the components, by altitude and month. Wind data from the Kauai site should be representative of the general flow over the Hawaiian islands and the project site above an altitude of about 6 to 10 km. Below this level there will be influence of the terrain on flow over the island of Hawaii.

2. The nominal launch trajectories of the Delta II rocket (assumed in the analyses in the EIS) were calculated relative to the observatories. Two trajectories were calculated, one for the east launch and one for the south launch.

3. Azimuth angles from the observatories to the Delta II nominal position, derived in (2) above, were calculated in one kilometer increments up to 30 km altitude above sea level and from 30 to 70 km in two kilometer increments. A wind direction from these azimuth angles would carry the exhaust plume straight over the top of the observatories. Offset angles were then calculated by incrementing the center azimuth angles by 0.1° increments for each altitude and projecting the plume trajectory at the new azimuth angle. The elevation angle at this azimuth and altitude was then calculated based on the closest horizontal distance of plume to the observatory along the new trajectory. Azimuth angles were incremented until the calculated elevation angle was less than 15°. These final angles (equally spaced on either side of the initial azimuth angle) were then used as the "critical" minimum and maximum angles for assessing the frequency of winds in that quadrant. Wind directions outside of these "critical" angles would not carry the plume above 15° at any time after the launch. The "critical" angles were limited to ±75° from the initial azimuth angle. This limitation was assumed to be reasonable since under moderate wind speeds movement along a path 75° off the azimuth direction of the observatories would soon carry the plume away from the observatories.

4. The statistical integration techniques described in the Barking Sands data volume (RCC, 1983) were coded into a working model. The model used the statistical data provided in (1) above to calculate the distribution of the wind direction. The technique considers the wind as a vector quantity and bivariate normally distributed. From the model, the probability of the wind direction being from a given direction was derived in one degree increments. The total probability of the wind direction was then numerically integrated between the critical angles derived in (3) above by altitude and month. The resulting values provided the probability (in percent) of the wind being from an unfavorable direction. The probability of the wind being from a favorable direction is therefore 100 minus the percentage of wind directions in the unfavorable direction. Altitudes from 5 to 52 km were included in the analysis. At altitudes of 4 km and below the plume will be below the altitude of the observatories. Above 52 km all stages of the rocket motors have been fully expended thus there is no plume. The Appendix provides chapter II of

the Range Reference Atmosphere (RCC, 1983) describing the derivation of the wind statistics and models. The model used in the calculations was based on section C.3.3 describing the derived distribution of the wind direction.

DATA EVALUATION

A summary of the model output for the frequency of winds from favorable directions is shown in Tables 1 and 2. The relationship of the probability from altitude to altitude is difficult to assess due to the nature of the statistical data. Guidance on the limitations of the statistical data set provided in the Range Reference Atmosphere statistics indicate the statistics with respect to the altitude profile cannot be derived. Thus the relationship of how frequently wind directions occur at one altitude when compared to another cannot be assessed. As an estimate of the maximum probability that winds would be favorable, the observed lowest statistical probability shown in the table was selected. This represents the best chance of favorable wind directions assuming the probabilities between altitudes are related and the distribution shown is typical rather than just statistically represented. On the basis of this assumption the maximum probability of favorable wind directions, by month, was plotted for the south and east launches, and is shown in Figures 1 and 2.

Additional runs of the model were made using a higher elevation angle criteria to assess what the affect would be on the launch probability. The results are discussed below.

CONCLUSIONS

Exhaust plumes from rocket launches at the proposed commercial space launch facility at Palima Point have the potential for impacting the observatories at Mauna Kea by the plume drift into the field of view. An analysis was performed using existing tropospheric and stratospheric wind data from Barking Sands on the island of Kauai to assess the probability of wind directions favorable to carrying the plume away from the observatory site. The results of the analysis showed the highest probability of favorable winds (i.e. the plume would not drift into the field of view) for a south launch occurred in June and July with a maximum probability of favorable launch wind directions of about 80%. For all months as a whole the maximum probability was just over 50%. By increasing the acceptable viewing angle from 15° to 20° the overall maximum probability was increased from just over 50% to about 75%.

For an east launch the maximum probability of favorable winds is considerably less with near zero probability during the late spring through early fall months and about a 50% probability for the late fall through early spring months. Overall, the maximum probability for the east launch was just over 30%. By increasing the acceptable angle to 20° the overall maximum probability increased from just over 30% to slightly under 40%.

REFERENCE

RCC (1983). Barking Sands, Hawaii, Range Reference Atmosphere 0-70 km Altitude. Meteorology Group, Range Commanders Council, White Sands Missile Range, New Mexico. Document 370-83. December.

Table 1. Probability (in percent) of "favorable wind directions" during a south launch.

Altitude (km msl)	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	99	99	99	99	99	99	99	99	99	98	98	99
6	99	99	98	98	98	98	97	97	97	97	97	98
7	98	98	98	98	97	96	97	97	96	96	96	97
8	98	98	97	97	97	95	96	97	96	95	95	96
9	98	98	97	97	96	95	96	97	96	94	94	96
10	98	98	97	97	96	94	96	97	96	94	94	96
11	99	98	97	97	96	94	96	97	96	94	94	96
12	99	99	98	98	96	94	96	97	96	94	94	97
13	99	99	99	99	97	94	95	96	96	93	94	97
14	99	99	99	99	97	94	95	95	95	93	94	96
15	98	99	98	99	97	93	92	91	92	91	93	95
16	97	98	98	99	96	92	85	85	88	89	92	94
17	94	96	95	97	93	88	88	90	87	85	89	90
18	90	92	91	93	89	92	99	99	96	86	84	84
19	85	87	87	86	86	98	100	100	100	92	83	82
20	84	86	85	85	92	100	100	100	100	96	87	86
21	87	86	85	89	95	100	100	100	100	97	87	86
22	87	86	83	91	98	100	100	100	100	98	87	86
23	88	87	85	93	99	100	100	100	100	99	87	85
24	87	85	85	91	99	100	100	100	100	97	84	80
25	87	85	84	89	98	100	100	100	100	98	81	78
26	81	83	81	88	98	100	100	100	100	98	79	79
27	78	81	77	84	96	100	100	100	100	95	76	79
28	79	80	75	82	94	100	100	100	100	93	74	78
29	82	80	72	79	87	100	100	100	99	85	76	78
30	84	81	73	78	89	100	100	100	100	86	83	82
32	77	79	74	72	77	97	98	99	92	71	75	78
34	70	69	67	70	77	89	94	96	76	65	74	68
36	70	69	62	66	73	93	99	97	77	68	81	65
38	68	67	62	66	72	95	97	95	74	68	82	69
40	63	63	62	68	74	96	99	97	74	75	82	70
42	59	56	57	66	78	95	98	96	74	69	86	64
44	60	54	54	60	65	91	94	89	68	63	86	62
46	58	53	54	46	48	84	91	77	57	63	81	57
48	52	59	59	45	44	78	89	64	49	65	77	55
50	55	64	63	51	43	82	86	57	45	66	77	55
52	62	60	61	56	47	80	76	51	42	67	76	54
Maximum Probability	52	53	54	45	43	78	76	51	42	63	74	54
Average of the maximum probability												57

Table 2. Probability (in percent) of "favorable wind directions" during an east launch.

Altitude (km msl)	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	99	99	99	99	99	99	99	99	99	98	98	99
6	99	99	98	98	98	98	97	97	97	97	97	98
7	98	98	97	97	97	96	97	97	96	95	96	97
8	97	98	97	97	96	95	96	97	96	94	95	96
9	98	97	97	97	96	95	96	97	96	94	94	96
10	98	98	97	97	96	94	96	97	95	94	94	95
11	99	98	97	97	96	94	96	97	95	93	94	96
12	99	99	98	98	96	94	95	97	96	93	93	97
13	99	99	99	98	96	94	95	96	96	93	93	97
14	99	99	98	99	96	93	94	95	94	92	93	96
15	98	99	98	99	96	93	92	91	92	91	92	95
16	97	98	97	99	95	90	84	84	87	87	90	94
17	93	96	95	97	92	85	83	86	85	82	87	89
18	88	90	89	91	87	87	97	98	93	84	81	81
19	81	84	84	83	81	95	100	100	99	89	81	79
20	80	82	81	81	85	99	100	100	99	92	84	83
21	83	81	80	83	87	99	100	100	99	92	80	81
22	80	80	77	83	87	98	100	100	99	91	78	79
23	79	79	76	82	85	94	98	98	97	85	75	77
24	72	70	69	68	67	74	75	77	74	63	68	68
25	63	64	63	54	42	39	40	39	40	43	60	63
26	62	63	60	52	37	34	37	32	30	36	60	66
27	65	66	57	53	38	34	31	30	30	34	60	67
28	69	69	60	54	34	25	24	20	22	36	64	68
29	72	70	62	54	40	19	23	15	19	40	67	71
30	74	71	64	56	39	7	10	8	9	45	75	73
32	69	77	69	59	36	6	1	1	4	52	81	70
34	67	71	65	57	35	6	2	1	6	59	86	73
36	65	68	62	54	28	4	1	1	18	64	86	73
38	65	63	60	56	28	2	0	1	30	72	90	75
40	63	61	60	57	21	1	0	2	36	80	96	77
42	62	57	63	55	15	0	0	1	40	84	99	78
44	60	58	67	53	4	0	0	1	40	88	100	78
46	59	61	74	49	2	0	0	1	39	92	100	78
48	55	63	80	55	4	0	0	1	43	94	100	80
50	57	65	84	60	5	0	0	10	46	95	100	79
52	60	73	90	61	7	0	0	18	48	94	100	79
Maximum Probability	55	57	57	49	2	0	0	1	4	34	60	63
Average of the maximum probability												32

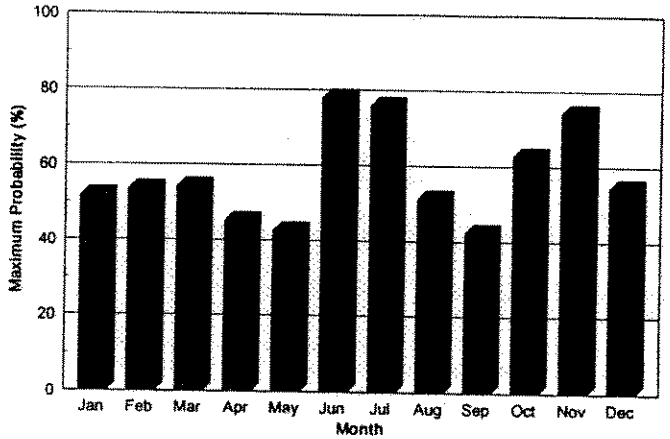


Figure 1. Maximum probability of "favorable wind directions" during a south launch.

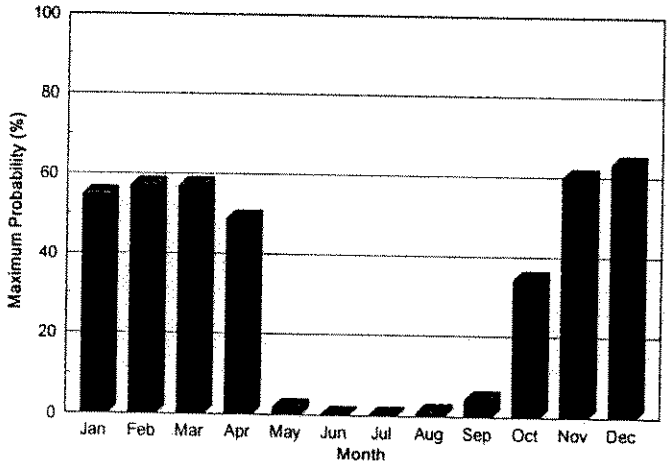


Figure 2. Maximum probability of "favorable wind directions" during an east launch.

APPENDIX

Range Reference Atmosphere 0-70 km Altitude (RCC, 1983)

Chapter II. Wind Statistics and Models

CHAPTER II. WIND STATISTICS AND MODELS

A. General Considerations

A.1. Objectives

An objective of the RRA is to furnish minimum tabulation for the wind statistics. To meet this objective, the bivariate normal probability distribution was adopted as a statistical model for the wind treated as a vector quantity at the RRA data levels. Only five statistical parameters are required to completely describe this probability function. In Cartesian coordinates these parameters are the means and standard deviations of the two orthogonal components and the correlation coefficient between the two components. These five statistical parameters for the U and V (meteorological coordinates) components are given in table I. The statistical properties of the bivariate normal probability distribution are used to derive many wind statistics that are of interest to the ranges and range users. This procedure produces consistent wind statistics that are connected through rigorous mathematical probability functions. By using these functions, extensive tabulations of wind statistics are avoided.

The statistical properties of the bivariate normal probability distribution presented for the vector wind statistical model are:

1) The wind components are univariate normally distributed.

2) The conditional distribution of one component given a value of the other component is univariate normally distributed.

3) The windspeed is of the form of a generalized Rayleigh distribution.

4) The frequency distribution of wind direction can be derived.

5) The conditional distribution of windspeed given a value of wind direction (wind rose) can be derived.

6) The five tabulated wind statistical parameters with respect to the meteorological U and V coordinate system can be derived for any arbitrary rotation of the orthogonal axes.

The probability distribution functions and sets of equations to derive wind statistics for the previously stated properties of the vector wind model are presented in this chapter. Symbols used are summarized in table A. Illustrative examples are presented in appendix A. No attempt is made to give the derivation of the probability functions. The reader is referred to Smith (1976) for some derivations and several applications of the probability distribution properties for wind statistics.

A.2. Data Quality Control

The U and V components of the wind were used to generate data limits set at plus and minus six standard deviations from the mean for each of the

TABLE A. LIST OF SYMBOLS USED IN CHAPTER II

N - The number of wind measurements in table I

r - A general variable for the bivariate normal probability distribution in polar coordinates

R - A generalized Rayleigh variable used for derived windspeed probability distribution

R (U, V) - The linear (product moment) correlation coefficient between the zonal and meridional wind components in table I

SK (W) - Skewness parameter for windspeed in table I

S (U) - The standard deviation of the zonal wind component in table I

S (V) - The standard deviation of the meridional wind component in table I

S (W) - The standard deviation of windspeed in table I

t - A standardized normal variate used in text table B

U - The zonal wind component

UBAR - The mean value of the zonal wind component in table I

V - The meridional wind component

VBAR - The mean value of the meridional wind component in table I

W - Windspeed or modulus of wind vector, a scalar quantity

WBAR - The mean value of windspeed in table I

X - A general component variable or coordinate axis

Y - A general component variable or coordinate axis

$\bar{X}$ - A general component mean value in the [x,y] coordinate system

$\bar{Y}$ - A general component mean value in the [x,y] coordinate system

α (alpha) - Rotation angle for the [x,y] coordinate system

TABLE A. (concluded)

θ (theta) - Wind direction in the polar coordinate system

$\lambda_{(\ )}$ (Lambda) - A parameter in the bivariate normal probability distribution in text table C

ξ (Xi) - The mean value in the standardized normal probability distribution used in text table B

π (Pi) - Constant = 3.14159 ...

ρ (Rho) - The general linear correlation coefficient between the two component variables in the [x,y] coordinate system

σ_x, σ_y - The general standard deviations of the x and y component variables in the [x,y] coordinate system.

quantities. These data limits were used to screen the wind data base, as described in section I.C. The data base was considered to be free from errors under the following conditions:

1) The skewness of the windspeed was below 4.0 at data levels where the mean windspeed was less than 15 m/s, and

2) The skewness of the windspeed was below 2.5 at data levels where the mean windspeed was greater than 15 m/s.

A.3 Limitations

For the wind statistics, the correlation coefficients for like wind components and unlike wind components between altitude levels were not computed. Therefore, wind statistics with respect to altitude (profile) cannot be derived from the RRA statistics. For wind profile modeling techniques the user is referred to Smith (1976). However, the wind statistics at discrete altitudes are valid; all of the probability distribution functions given in chapter II can be derived from the five wind component statistical parameters contained in table I, and the derived distributions can be considered as wind models at discrete altitudes.

By convention, in the statistical literature Greek letters are used for population or theoretically known parameters, and sample estimates are denoted by English alphabetical letters or with a "hat" (^) over the Greek letters. In chapter II Greek letters are used for the variances and the linear correlation coefficient, and the means are denoted by $\bar{X}$ and $\bar{Y}$ when dealing with the bivariate normal distribution. It will always be understood that table I contains sample estimates of the statistical parameters and they are with respect to the meteorological U and V coordinate system.

B. Coordinate System and Computation of Statistical Parameters

B.1. Coordinate System

Wind measurements are recorded in terms of magnitude and direction. The wind direction is measured in degrees clockwise from true north and is the direction from which the wind is blowing. The wind magnitude (the modulus of the vector) is the scalar quantity and is referred to as windspeed or scalar wind. A statistical description that accounts for the wind as a vector quantity is appropriate and requires a coordinate system.

For the RRA the standard meteorological coordinate system has been chosen for the wind statistics, all tables of statistical parameters, and related discussions because the coordinate system used in aerospace and related applied fields has not always been consistent.

Using figure 1, the polar and Cartesian forms for the meteorological coordinate system are defined:

W = windspeed, scalar wind, or magnitude of the wind vector in meters per second.

θ = wind direction. θ is measured in degrees clockwise from true north and is the direction from which the wind is blowing.

U = zonal wind component, positive west to east, in meters per second.

V = meridional wind component, positive south to north, in meters per second.

The components θ and W define the polar form, and the U-V components define the Cartesian forms:

$$U = -W \sin\theta \quad , \quad 0 \leq \theta \leq 360° \tag{1}$$

$$V = -W \cos\theta . \tag{2}$$

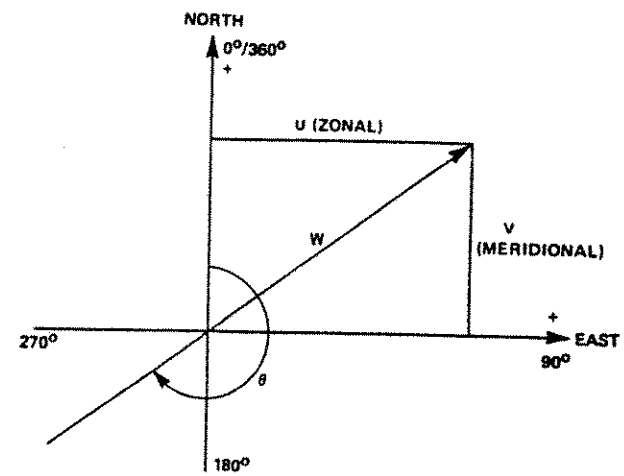


Figure 1. The meteorological coordinate system.

It is helpful to note the difference between the mathematical convention for a vector direction and the meteorological convention for wind direction:

$$\theta \text{ met} = 270 - \theta \text{ math} \qquad (3)$$

when $0 \leq \theta$ math $\leq 270°$

$$\theta \text{ met} = 360 + (270 - \theta \text{ math})$$

when $270 \leq \theta$ math $\leq 360°$

B.2 Computation of Statistical Parameters

The wind statistical parameters in table I for the means and standard deviations of the U and V wind components and windspeed and the skewness parameter of windspeed were computed using the sums technique presented in chapter III.C.3. In addition, the linear (product moment) correlation coefficient between the U and V wind components, r (u,v) in table I, was computed. This correlation coefficient is defined as

$$r\,(u,v) = \frac{\sum_{i=1}^{n} (U_i - \bar{U})\,(V_i - \bar{V})}{N\; s(u) \cdot s(v)} \quad . \qquad (4)$$

These statistical parameters are with respect to the Standard Meteorological Coordinate System.

C. Statistical Wind Models

C.1. Wind Component Statistics

The univariate normal (Gaussian) probability distribution function is used to obtain wind component statistics. In generalized notations, this probability density function (pdf) is

$$f\,(t) = \frac{e^{-\frac{t2}{2}}}{\sqrt{2\pi}} \quad , \qquad (5)$$

where $t = X - \xi/\sigma_x$ is the standardized variate, with ξ defining the mean and σ_x the standard deviation. The probability distribution function (PDF) is

$$F(X) = \int_{-\infty}^{X} f(t)\,dt \quad . \qquad (6)$$

Because this integral cannot be obtained in closed form, it is widely tabulated for zero mean and unit standard deviation. For a convenient reference for the RRA, selected values of F(X) are given in table B. To emphasize the connotation of probability, F(X) is shown in table B as $P\{X\}$. The t values in table B are used as multiplier factors to the standard deviation to express the probability that a normally distributed variable, X, is less than or equal to a given value as

$$P\left\{X \leq \text{mean} + t\,\sigma_x\right\} = \text{probability, } p \quad . \qquad (7)$$

For example, when t = 1.6449, the probability that X is less than or equal to the mean plus 1.6449 standard deviations is 0.95. That value of X that is less than or equal to the mean plus 1.6449 standard deviations is called the 95th percentile value of X. Also given in table B are the numerical values to express the probability that X falls in the interval X_1 and X_2; i.e.,

$$P\left\{X_1 \leq X \leq X_2\right\} = \text{Interpercentile Range} \quad . \qquad (8)$$

where

$$X_1 = \bar{X} - t\,\sigma_x$$

$$X_2 = \bar{X} + t\,\sigma_x \quad .$$

For t = 1.9602 the probability that X lies in the interval X_1 and X_2 is 0.95. The values of X_1 and X_2 in this example comprise the 95th interpercentile range.

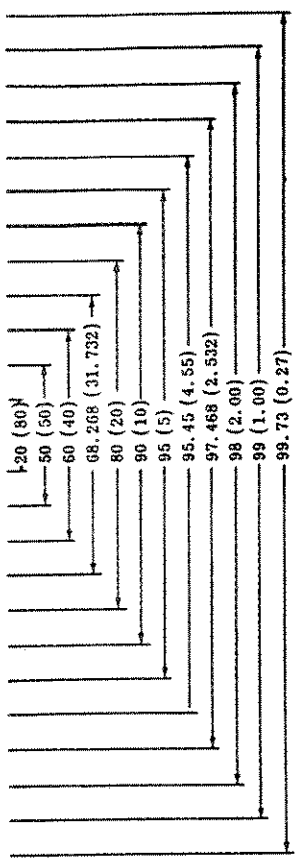
For a normally distributed variable, the mode (most frequent value) and the median (50th percentile value) are the same as the mean value. The means and standard deviations of the U and V wind components from table I are used in equations (7) and (8) to compute the percentile values and interpercentile ranges of the U and V wind components. When equation (7) is illustrated on a normal probability graph, a straight line is formed.

C.2. The Vector Wind Model

Because wind is a vector quantity having direction and magnitude that can be expressed as two components in an orthogonal coordinate system, a probability model that describes the joint relationship is the bivariate normal probability distribution. In general component notation, the bivariate normal probability density function (BNpdf) is

TABLE B. VALUES OF t FOR STANDARDIZED NORMAL (UNIVARIATE) DISTRIBUTION FOR PERCENTILES AND INTERPERCENTILE RANGES

t	P(X)	X	$P\{X_1 \le X \le X_2\}$ (%)
-3.0000	0.00135	$\xi - 3.0000\,\sigma$	
-2.5758	0.00500	$\xi - 2.5758\,\sigma$	
-2.3263	0.01000	$\xi - 2.3263\,\sigma$	
-2.2365	0.01266	$\xi - 2.2365\,\sigma$	
-2.0000	0.02275	$\xi - 2.0000\,\sigma$	
-1.9602	0.02500	$\xi - 1.9602\,\sigma$	
-1.6449	0.05000	$\xi - 1.6449\,\sigma$	
-1.2816	0.10000	$\xi - 1.2816\,\sigma$	
-1.0000	0.15866	$\xi - 1.0000\,\sigma$	
-0.8416	0.20000	$\xi - 0.8416\,\sigma$	
-0.6745	0.25000	$\xi - 0.6745\,\sigma$	
-0.2533	0.40000	$\xi - 0.2533\,\sigma$	
0.0000	0.50000	ξ	
0.2533	0.60000	$\xi + 0.2533\,\sigma$	
0.6745	0.75000	$\xi + 0.6745\,\sigma$	
0.8416	0.80000	$\xi + 0.8614\,\sigma$	
1.0000	0.84134	$\xi + 1.0000\,\sigma$	
1.2816	0.90000	$\xi + 1.2816\,\sigma$	
1.6449	0.95000	$\xi + 1.6449\,\sigma$	
1.9602	0.97502	$\xi + 1.9602\,\sigma$	
2.0000	0.97725	$\xi + 2.0000\,\sigma$	
2.2365	0.98734	$\xi + 2.2365\,\sigma$	
2.3263	0.99000	$\xi + 2.3263\,\sigma$	
2.5758	0.99500	$\xi + 2.5758\,\sigma$	
3.0000	0.99865	$\xi \quad 3.0000\,\sigma$	



where $X_1 = \xi - t\sigma$
and $X_2 = \xi + t\sigma$

$$f(X,Y) = \frac{1}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}}\left[\exp\frac{-1}{2(1-\rho^2)}\left\{\frac{(X-\bar{X})^2}{\sigma_x^2} - \frac{2\rho(X-\bar{X})(Y-\bar{Y})}{\sigma_x\sigma_y} + \frac{(Y-\bar{Y})^2}{\sigma_y^2}\right\}\right] \quad -\infty \le X \le \infty \text{ and}$$

$$-\infty \le Y \le \infty \quad . \tag{9}$$

where the five parameters are $\bar{X}, \bar{Y}$, the component means; σ_x, σ_y, the component standard deviations; and ρ, the correlation coefficient between the two component variables, X and Y.

For many applications the interest is in determining the probability that a point $\{X,Y\}$ will fall within a contour of equal probability density. The exponential terms of equation (9), when set equal to a constant, λ^2, give a family of ellipses depending on the value of the constant. The ellipses have a common center at the point $\{\bar{X},\bar{Y}\}$. Integration of equation (9) over the region bounded by the contours of equal probability density gives

$$P(\lambda) = 1 - e^{\frac{-\lambda^2}{2(1-\rho^2)}} \quad . \tag{10}$$

Solving for λ^2 and replacing $P(\lambda)$ by p gives

$$\lambda^2 = -2(1-\rho^2)\ln(1-p) \quad . \tag{11}$$

Now define

$$\lambda_e = \sqrt{2}\sqrt{-\ln(1-p)} \quad . \tag{12}$$

For ready reference and comparisons, λ_e is shown in table C for selected values of p.

TABLE C. VALUES OF λ FOR BIVARIATE NORMAL DISBRIBUTION ELLIPSES AND CIRCLES

P(%)	λ_e (ellipse)	λ_c (circle)	P(%)	λ_e (ellipse)	λ_c (circle)
0.000	0.0000	0.0000	65.000	1.4490	1.0246
5.000	0.3203	0.2265	68.268	1.5151	1.0713
10.000	0.4590	0.3246	70.000	1.5518	1.0973
15.000	0.5701	0.4031	75.000	1.6651	1.1774
20.000	0.6680	0.4723	80.000	1.7941	1.2686
25.000	0.7585	0.5363	85.000	1.9479	1.3774
30.000	0.8446	0.5972	86.466	2.0000	1.4142
35.000	0.9282	0.6563	90.000	2.1460	1.5175
39.347	1.0000	0.7071	95.000	2.4477	1.7308
40.000	1.0108	0.7147	95.450	2.4860	1.7579
45.000	1.0935	0.7732	98.000	2.7971	1.9778
50.000	1.1774	0.8325	98.168	2.8284	2.0000
54.406	1.2533	0.8862	98.889	3.0000	2.1213
55.000	1.2637	0.8936	99.000	3.0348	2.1460
60.000	1.3537	0.9572	99.730	3.4393	2.4320
63.212	1.4142	1.0000	99.9877	4.2426	3.0000

$$\lambda_e = \sqrt{2}\,\sqrt{-\ln(1-P)}$$

$$\lambda_c = \sqrt{-\ln(1-P)}$$

The probability ellipse that contains p-percent of the wind vectors expressed in the most general form is the conic defined by

$$AX^2 + BXY + CY^2 + DX + EY + F = 0 \quad , \tag{13}$$

where

$$A = \sigma_y^{\,2}$$

$$B = -2\rho\sigma_x\sigma_y$$

$$C = \sigma_x^{\,2}$$

$$D = 2\sigma_x\sigma_y\,\rho\bar{Y} - 2\sigma_y^{\,2}\bar{X} = -\,(B\bar{Y} + 2A\bar{X})$$

$$E = 2\sigma_x\sigma_y\,\rho\bar{X} - 2\sigma_x^{\,2}\bar{Y} = -\,(B\bar{X} + 2C\bar{Y})$$

$$F = A\bar{X}^2 + C\bar{Y}^2 + B\bar{X}\bar{Y} - AC\,(1-\rho^2)\,\lambda_e^{\,2} \quad ,$$

and

$$\lambda_e = \sqrt{2}\,\sqrt{-\ln(1-\rho)} \quad .$$

For graphical presentations, the range of the variable is important in order to arrange the scale. The largest and smallest values of X and Y for a given probability ellipse, p, are given by

$$X_{L,S} = \bar{X} \pm \sigma_x\lambda_e \tag{14}$$

$$Y_{L,S} = \bar{Y} \pm \sigma_y\lambda_e \quad . \tag{15}$$

where, as, before, $\lambda_e = \sqrt{2}\ \sqrt{-\ln(1-p)}$.

Although there are several approaches to graphing the probability ellipses, the following procedure is advantageous for electronic computer plotting. In establishing the computer plotting program, the sample estimates for $\bar{X},\bar{Y}$, σ_x, σ_y, and ρ are constants in equation (13). The user makes the choice of probability ellipses desired. Thus, p in equation (12) is programmed as a parameter. The largest and smallest values for X and Y are computed by equations (14) and (15) for the largest probability ellipse selected. This sets the graphical scale. Values of X within the range of "X smallest" to "X largest" are obtained by incrementing X between these limits. Using the quadratic equation, a solution for Y of equation (13) is made and plotted for each value of X. The centroid $(\bar{X},\bar{Y})$ for the family of probability ellipses is plotted as a point. Labeling and other identification complete the plotting program.

For a given probability, equation (13) defines an ellipse that contains p-percent of the points X,Y. Since the entire area under the bivariate normal density function [equation (9)] is unity, upon integration for a given probability ellipse, that given ellipse contains p-percent of the total area. In the wind statistics, p-percent of the wind vectors fall within the specified probability ellipse. From this point of view, a specified probability ellipse gives the joint probability that p-percent of the U-V components lie within the given ellipse.

When $\sigma_x^2 = \sigma_y^2 = \sigma^2$ and $\rho = 0$ in the bivariate normal distribution, the probability ellipses of equation (13) reduce to circles whose centers are at the means $\bar{X},\bar{Y}$. The radii of the probability circles are $\sigma_{V1}\lambda_c$, where

$$\sigma_{V1} = \sqrt{2\sigma^2} \tag{16}$$

and

$$\lambda_c = \sqrt{-\ln(1-p)} \quad . \tag{17}$$

Values for λ_c for selected probabilities, p, are given in table C.

Because this function is simple, it can easily be graphed manually. However, the generalized plotting technique for electronic computer plotters, as represented by equation (13), can be advantageously used.

C.3. Derived Distributions for Wind Statistics

In this subsection the probability distribution functions and sets of equations are presented to derive certain probability distribution functions for wind statistics. These derived probability distributions are:

1) The conditional distribution of wind components

2) The generalized Rayleigh distribution for windspeed

3) The distribution for wind direction

4) The conditional distribution of windspeed given a wind direction (wind rose).

The required five statistical parameters for these derived distributions for wind statistics are given in table I.

C.3.1 The Conditional Distribution of Wind Components

Given that two random variables X and Y are bivariate normally distributed, the conditional distribution f(Y|X) is read as f(Y) given X, and likewise f(X|Y) is read as f(X) given Y. The conditional probability distribution function F(Y|X) has the mean E(Y|X) and variance $\sigma^2_{(x|y)}$, where

$$E(Y|X^*) = \bar{Y} + \rho\left(\frac{\sigma_y}{\sigma_x}\right)(X^* - \bar{X}) \tag{18}$$

and

$$\sigma^2_{(y|x^*)} = \sigma_y^2\,(1-\rho^2) \quad . \tag{19}$$

The conditional standard deviation is

$$\sigma_{(y|x^*)} = \sigma_y\sqrt{1-\rho^2} \quad . \tag{20}$$

By interchanging the variables and parameters, the conditional distribution function for F(X|Y*) has the conditional mean

$$E(X|Y^*) = \bar{X} + \rho\left(\frac{\sigma_x}{\sigma_y}\right)(Y^* - \bar{Y}) \quad , \tag{21}$$

conditional variance

$$\sigma^2_{(x|y^*)} = \sigma_x^{\,2}(1 - \rho^2) \quad . \tag{22}$$

and conditional standard deviation

$$\sigma_{(x|y^*)} = \sigma_x\sqrt{1 - \rho^2} \quad . \tag{23}$$

The preceding conditional probability distribution functions are univariate normal distributions for a (fixed) given value for one of the bivariate normal variables. Thus, the t-values given in table B are applicable for conditional probability statements. For example,

$$F(Y|X^*) = E(Y|X^*) + t\sigma_{(y|x^*)} \quad . \tag{24}$$

For $t = 1.6449$ there is a 95 percent chance that Y is less than or equal to $\bar{Y} + 1.6449\,\sigma_{(y|x^*)}$ given that $X = X^*$. In symbols this statement reads

$$P\left\{ Y \leq E(Y|X^*) + 1.6449\,\sigma_{(y|x^*)} \;|X = X^*\right\} = 0.9500 \quad . \tag{25}$$

Interval probability statements can also be made; namely,

$$P\left\{ Y_1 = E(Y|X^*) - t\sigma_{(y|x^*)} \leq Y \leq Y_2 = E(Y|X^*) + t\sigma_y \;|X = X^*\right\}$$

where X^* can take on any fixed value of X, but a convenient arrangement is to let $X^* = \bar{X} \pm t\sigma_x$.

The close connection of the regression function of Y on X to the conditional mean for the bivariate normal distribution is noted; namely,

$$Y = \bar{Y} + \rho\left(\frac{\sigma_y}{\sigma_x}\right)(X - \bar{X}) \quad . \tag{26}$$

Similarly, the regression function of X on Y is

$$X = \bar{X} + \rho\left(\frac{\sigma_y}{\sigma_x}\right)(Y - \bar{Y}) \quad . \tag{27}$$

These are linear functions and express the same results as would be obtained from a least-squares regression line.

C.3.2. The Generalized Rayleigh Distribution for Windspeed

If two random variables, X and Y, are bivariate normally distributed, then the probability distribution for the modulus, R, can be derived in terms of the five parameters that define the bivariate normal distribution.

$$R = \sqrt{X^2 + Y^2} \tag{28}$$

The distribution of R so derived is called a generalized Rayleigh distribution because there are no restrictions on the parameters. For applications to the RRA, the variable R is recognized as windspeed or the modulus of the wind vector.

The probability density function for R is expressed as

$$f(R) = a_0 R e^{-a_1 R^2}\left[I_0(a_2 R^2)\, I_0(a_3 R) + 2\sum_{k=1}^{\infty} I_k(a_2 R^2)\, I_{2k}(a_3 R)\cos 2k\psi \right] R \geq 0 \quad . \tag{29}$$

The functions, $I_0(\cdot)$, $I_k(\cdot)$, and $I_{2k}(\cdot)$ are the modified Bessel functions of the first kind for zero order, kth order, and 2kth order. The coefficients are

$$a_0 = \exp\left[-\frac{1}{2}\left\{\frac{\bar{X}^2}{\sigma_a^2} + \frac{\bar{Y}^2}{\sigma_b^2}\right\}\right] \Big/ \sigma_a \sigma_b \quad ,$$

where σ_a^2 and σ_b^2 are the rotated variances to produce zero correlation between X and Y. σ_a and σ_b are the positive and negative roots[1] of the expression

$$\sigma^2_{(+,-)} = \frac{1}{2}\left\{\sigma_x^2 + \sigma_y^2 \pm \left[(\sigma_x^2 + \sigma_y^2)^2 - 4\sigma_x^2\sigma_y^2(1 - \rho^2)\right]^{1/2}\right\} \quad ,$$

$$a_1 = (\sigma_x^2 + \sigma_y^2)/4(1 - \rho^2)\ \sigma_x^2\sigma_y^2 \quad ,$$

$$a_2 = \frac{\left[(\sigma_x^2 - \sigma_y^2)^2 + 4\rho^2\sigma_x^2\sigma_y^2\right]^{1/2}}{4(1 - \rho^2)\ \sigma_x^2\sigma_y^2} \quad ,$$

$$a_3 = \left[\left(\frac{\bar{X}}{\sigma_a^2}\right)^2 + \left(\frac{\bar{Y}}{\sigma_b^2}\right)^2\right]^{1/2} \quad ,$$

1. *This computational form is obtained from the determinant*

$$\begin{vmatrix} \sigma_x^2 - K & \sigma_x\sigma_y\rho \\ \sigma_x\sigma_y\rho & \sigma_y^2 - K \end{vmatrix} ,$$

where K is $\sigma^2_{(+,-)}$, *and* σ_a *and* σ_b *are analogous to the standard deviation of the major and minor axes of the bivariate normal probability ellipse.*

and

$$\tan\psi = \frac{\bar{Y}}{\bar{X}}\ \frac{\sigma_a^2}{\sigma_b^2} \quad .$$

Since this density function cannot be integrated in closed form from zero to R, numerical integration is used to obtain practical results for the probability distribution function; i.e.,

$$F(R) = \int_0^{R*} f(R)\ dR \quad . \tag{30}$$

A number of special cases can be obtained from the general Rayleigh distribution [equation (29)], the simplest of which is to let $\sigma_x \equiv \sigma_y = \sigma$ and $\bar{X} = \bar{Y} = 0$ with independent variables X and Y. This gives

$$f(R) = \frac{R}{\sigma^2}\ e^{-R^2/2\sigma^2} \quad , \tag{31}$$

which is recognized as the classical Rayleigh probability density function. The density function, equation (31), can be integrated in closed form over any range of the variable R. Hence, the probability distribution function, F(R), for equation (31) is

$$F(R) = 1 - \exp\left\{\frac{-R^2}{2\sigma^2}\right\} \quad . \tag{32}$$

C.3.3. The Derived Distribution of Wind Direction

Considering the wind as a vector quantity and bivariate normally distributed, the wind direction can be derived. This is done by first writing the bivariate normal probability density function in polar coordinates whose variables are

$$g(r,\theta) = r d_1 e^{-\frac{1}{2}(a^2 r^2 - 2br + c^2)} \quad , \qquad (33)$$

(see footnote 2)

where

$$a^2 = \frac{1}{(1-\rho^2)}\left[\frac{\sin^2\theta}{\sigma_x^2} - \frac{2\rho\cos\theta\sin\theta}{\sigma_x\sigma_y} + \frac{\cos^2\theta}{\sigma_y^2}\right] \quad ,$$

$$b = \frac{-1}{(1-\rho^2)}\left[\frac{\bar{x}\sin\theta}{\sigma_x^2} - \frac{\rho(\bar{x}\cos\theta + \bar{y}\sin\theta)}{\sigma_x\sigma_y} + \frac{\bar{y}\cos\theta}{\sigma_y^2}\right] \quad ,$$

$$c^2 = \frac{1}{(1-\rho^2)}\left[\frac{\bar{x}^2}{\sigma_x^2} - \frac{2\rho\bar{x}\bar{y}}{\sigma_x\sigma_y} + \frac{\bar{y}^2}{\sigma_y^2}\right] \quad ,$$

$$d_1 = \frac{1}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}} \quad ,$$

$r = \sqrt{x^2 + y^2}$ is the modulus of the vector or speed, and θ is the direction of the vector. After integrating $g(r,\theta)$ over $r = 0$ to ∞, the probability density function of θ is

$$g(\theta) = \frac{d_1}{a^2} e^{-\frac{1}{2}c^2}\left[1 + \sqrt{2\pi}\left(\frac{b}{a}\right) e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left(\frac{b}{a}\right)\right] \quad , \qquad (34)$$

2. *This expression, equation (33), in Smith (1976) is given with respect to the mathematical convention for a vector direction.*

where a^2, b, c^2, and d_1 are as previously defined in equation (33) and

$$\Phi\left(\frac{b}{a}\right) = \Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{1}{2}t^2}\, dt$$

is taken from tables of normal distribution functions or made available through a computer subroutine.

If desired, equation (34) can be integrated numerically over a chosen range of θ to obtain the probability that the vector direction will lie within the chosen range; i.e.,

$$F(\theta) = \int_{\theta_2}^{\theta_1} g(\theta)\, d\theta \quad . \qquad (35)$$

One application may be to obtain the probability that the wind will flow from a given quadrant or sector as, for example, onshore.

C.3.4. The Derived Conditional Distribution of Windspeed Given the Wind Direction (Wind Rose)

Continuing with the considerations in section C.3.3. of this chapter, the conditional probability density function (pdf) for windspeed, r, given a specified value for the wind direction, θ, can be expressed as

$$f(r|\theta) = \frac{a^2 r e^{-\frac{1}{2}(a^2 r^2 - br)}}{1 + \sqrt{2\pi}\left(\frac{b}{a}\right) e^{\frac{1}{2}\left(\frac{b}{a}\right)^2} \Phi\left(\frac{b}{a}\right)} \quad , \qquad (36)$$

where the coefficients, $\underline{a}$ and $\underline{b}$ and the function $\Phi\left\{\frac{b}{a}\right\}$ are as previously defined in equation (33) and in equation (34).

From equation (36) the mode (most frequent value) of the conditional windspeed given a specified value of the wind direction is the positive solution of the quadratic equation,

$$a^2 r^2 - br - 1 = 0 \quad , \qquad (37)$$

which is

$$(\bar{r}\,|\,\theta) = \frac{1}{2a}\left[\left(\frac{b}{a}\right) + \sqrt{4 + \left(\frac{b}{a}\right)^2}\right] \quad . \tag{38}$$

The locus of the conditional modal values of windspeed when plotted in polar form versus the given wind directions forms an ellipse.

The noncentral moment for equation (36) is expressed as

$$\mu_n' = \int_0^\infty r^n \, f(r|\theta)\, dr \quad . \tag{39}$$

Now the first noncentral moment is identical to the first central moment or the expected value, $E\,(r|\theta)$. The integration of equation (39) for the first moment is sufficiently simple to yield practical computations and can be expressed as

$$E(r|\theta) = \frac{\left(\frac{b}{a}\right) + \left[1 + \left(\frac{b}{a}\right)^2\right]\sqrt{2\pi}\; e^{\frac{1}{2}\left(\frac{b}{a}\right)^2}\; \phi\left\{\frac{b}{a}\right\}}{a\left[1 + \left(\frac{b}{a}\right)\sqrt{2\pi}\; e^{\frac{1}{2}\left(\frac{b}{a}\right)^2}\; \phi\left\{\frac{b}{a}\right\}\right]} \quad . \tag{40}$$

Hence, equation (40) gives the conditional mean value of the windspeed given a specified value for the wind direction.

The integration of equation (36) for the limits $r = 0$ to $r = r^*$ gives the probability that the conditional windspeed is $\leq r^*$ given a value for the wind direction, θ. This conditional probability distribution (PDF) can be written as

$$\Pr\left\{r \leq r^* \mid \theta = \theta_o\right\} = 1 - \left[\frac{e^{-\frac{1}{2} r_s^2} + \sqrt{2\pi}\left(\frac{b}{a}\right)\left\{1 - \phi\,(r_s)\right\}}{e^{-\frac{1}{2}\left(\frac{b}{a}\right)^2} + \sqrt{2\pi}\left(\frac{b}{a}\right)\phi\left\{\frac{b}{a}\right\}}\right] , \tag{41}$$

where

$$r_s = \left[a\, r^* - \left(\frac{b}{a}\right)\right] \quad .$$

By definition, equation (41) is an expression for a "wind rose." Empirical wind rose statistics are often tabulated or graphically illustrated giving the frequency that the windspeed is not exceeded for those windspeed values that lie within assigned class intervals of the wind direction. After evaluation of equation (41) for various values of windspeed, r^*, and the given wind directions, θ, interpolations can be performed to obtain various percentile values of the conditional windspeed.

For the special case when $\underline{b}$ in equation (33) equals zero (i.e., for $\bar{x} \equiv \bar{y} = 0$), the conditional modal values of windspeeds [equation (38)], the conditional mean values of windspeeds [equation (40)], and the fixed conditional percentile values of windspeeds [interpolated from evaluations of equation (41)], when plotted in polar form versus the given wind directions, produce a family of ellipses.

For the special case when $\bar{x} = \bar{y} = 0$, equation (36) reduces to the following simple case:

$$\Pr\left\{r \leq r^* \mid \theta = \theta_0\right\} = 1 - e^{-\frac{a^2 r^{*2}}{2}} \quad . \tag{42}$$

There is a special significance of equation (42) when related to the bivariate normal probability distribution. If r^* and θ are measured from the centroid of the probability ellipse, then the probability that $r \leq r^*$ is the same as the given probability ellipse. Further, solving equation (42) for r^*, gives

$$r^* = \frac{1}{a}\sqrt{-2 \ln (1 - P)} \quad . \tag{43}$$

If a probability ellipse P is chosen, equation (42) gives the distance of r along any θ from the centroid of the ellipse to the intercept of the specified probability ellipse. If there is an interest in conditional probability of winds for a given θ relative to the monthly means, equation (43) is applicable. If it is desired to find the magnitude of the wind along any θ relative to the monthly mean to the intercept of a given probability ellipse, equation (43) is applicable.

D. Statistical Parameters With Respect To Any Orthogonal Axes

The five wind statistical parameters presented in table I are given with respect to the standard meteorological coordinate system; i.e., these parameters are for the U and V components. For many aerospace vehicles and range applications, there is a need for wind statistics with respect to orthogonal axes other than west to east and south to north. For example, it may be required to present wind statistics with respect to a flight azimuth of an

aerospace vehicle whose flight azimuth is α degrees from true north measured in a clockwise direction. The following sets of equations are presented to compute the five parameters for the new coordinate axes rotated α degrees clockwise from true north.

a. Rotation of the means through α degrees:

$$\bar{X}_\alpha = \bar{X} \cos (90 - \alpha) + \bar{Y} \sin (90 - \alpha) \tag{44}$$

$$\bar{Y}_\alpha = \bar{Y} \cos (90 - \alpha) - \bar{X} \sin (90 - \alpha) \quad . \tag{45}$$

b. Rotation of the variances through α degrees:

$$\sigma_{x_\alpha}^2 = \sigma_x^2 \cos^2 (90 - \alpha) + \sigma_y^2 \sin^2 (90 - \alpha)$$

$$+ 2\rho\sigma_x\sigma_y \cos (90 - \alpha) \sin (90 - \alpha) \tag{46}$$

$$\sigma_{y_\alpha}^2 = \sigma_y^2 \cos^2 (90 - \alpha) + \sigma_x^2 \sin^2 (90 - \alpha)$$

$$- 2\rho\sigma_x\sigma_y \cos (90 - \alpha) \sin (90 - \alpha) \quad , \tag{47}$$

c. Rotation of the linear correlation coefficient through α degrees:

$$\rho_\alpha = \frac{\text{cov } (X,Y)_\alpha}{\sigma_{x_\alpha} \sigma_{y_\alpha}} \quad , \tag{48}$$

where cov $(X,Y)_\alpha$ is the rotated covariance,

$$\text{cov } (X,Y)_\alpha = \text{cov } (X,Y) \, [\cos^2 (90 - \alpha) - \sin^2 (90 - \alpha)]$$

$$+ \cos (90 - \alpha) \sin (90 - \alpha) \, (\sigma_y^2 - \sigma_x^2)$$

and

$$\text{cov } (X,Y) = \rho\sigma_x\sigma_y \quad .$$

By using these rotational equations, the bivariate normal distribution with respect to any desired rotated coordinates can be obtained from sample estimates that have been computed with respect to a specific axis. The marginal distributions after rotation are also normally (univariate) distributed. Using the rotational equations greatly reduces computational efforts for applications requiring statistics with respect to several coordinate axes.

Appendix A presents some illustrative examples for the wind statistics of the specific RRA.

Financial Feasibility Studies Related to the Proposed Hawaii Spaceport

Office of Space Industry
Department of Business, Economic Development and Tourism
September 1993

In February of 1993 the Department of Business Economic Development and Tourism (DBEDT) released a Conceptual Plan and Project Description which discussed the economic feasibility of the proposed commercial satellite launching facility. The results of a financial model analysis were presented along with many of the assumptions underlying that model. This financial data was provided to Decision Analysts Hawaii for their use in preparing the financial analysis section of the Environmental Impact Statement.*

Due to public and government interest in the financial aspects contained in the EIS studies, DBEDT has prepared a more detailed information package. It contains a discussion of the development of the financial model and spreadsheet printouts for three different launch rate scenarios.

Dr. Joseph Miccio, professor emeritus at the University of Hawaii's College of Business Administration assisted in structural development of the financial model and with general financial assumptions. Mr. Peter Minderman, former Director of Engineering Development at Kennedy Space Center assisted with specific spaceport facilities cost estimates and provided guidance on cost phasing and development strategy.

*EIS Volume IX, Appendix A, Reference 1

A commercial satellite launching facility has been proposed for the Big Island to take advantage of Hawaii's unique mid-Pacific location and ability to launch into any orbit from a single launch site.

A fundamental question is: can such a facility make money, and if so what role should the State play in supporting its development?

Role of the State

The state will not develop or operate the spaceport. This will be undertaken by a consortium of private companies. It will be their capital that is at risk, and in fact the launch facility will not be built if private industry is not willing to make the investment The state is studying the impacts of conducting launch operations and has recently released an extensive analysis in the Environmental Impact Statement. If the project moves forward the State will assist by making necessary off-site infrastructure improvements, acquiring control of land within the population control zone and assuming a safety oversight role.

Feasibility Analysis

The satellite launch market is difficult to assess. Conservative estimates show that there is more than adequate worldwide launch capacity through the year 2,000. New technologies as well as events like the military draw down and the dissolution of the former Soviet Union have had a profound effect on the commercial market. Recently proposed low earth orbit communications systems comprised of dozens of satellites may result in market expansion. University research programs could open up new opportunities for scientific studies with frequent launches of small payloads.

Due to these uncertainties, DBEDT has not based its spaceport feasibility studies solely on market analysis. We have chosen three different launch rates for analysis: 15, 18 and 22 orbital launches per year.

Results

Achieving success in an endeavor of this type will not be easy. There are no other purely commercial launch facilities currently in operation. However, many states and countries have realized the potential and are striving to develop their own spaceports.

DBEDT's financial feasibility analysis has shown that it will be possible but difficult for a consortium to operate the spaceport at a profit with fewer than 15 orbital launches per year. As the launch rate increases; so do profits.

Financial Model Assumptions

The purpose of the financial projection is to gauge the financial feasibility of a launch facility in Hawaii from the perspective of a private consortium involved in the development. Projections are based on assumptions for a conceptual plan, and not an actual design. For this reason, specific amounts (those for maintenance and vehicle costs, for example) are based on preliminary estimates. The results, therefore, should be used strictly to gauge the order of magnitude of revenues and expenses, and not for specific financial planning.

As is necessary for any financial projection, many assumptions were used in providing the inputs for the model. Detailed financial assumptions are listed in the Assumptions pages of the model. Other assumptions include:

Role of the Consortium. The consortium would develop all areas common to all launch vehicles, such as the roads, tracking facilities, and propellant storage and payload processing areas, but not launch vehicle specific areas, such as the launch pads.

Launch Rates. The launch rates used in the model can be achieved through the conventional processing techniques used at existing launch ranges. Although these rates constitute a significant percentage of the available launch market, they are achievable assuming an anchor tenant with high launch rates, such as one of the proposed low earth orbit communication satellite systems.

Launch Prices. The launch prices are made up of two components: range support prices and payload processing prices. Range support includes range safety, propellant storage and technical services. Payload processing includes spacecraft integration and check-out, fueling, and spin-balancing (if necessary).

Capital Costs. Capital costs incurred by the developer would be for on-site roads, utilities, site development, buildings, equipment, and vehicles, as well as margins for contractor's profit, general requirements, and contingencies. Projected capital costs for the developer range from $67 million to $70 million.

Other Assumptions. Additional assumptions include a debt-to-equity ratio of 1:1, an inflation rate of 4%, a federal corporate tax of 34%, and a state tax of 6.4%. The financial model included assumed launch rates, staffing and capital expenditure schedules as inputs.

Conservative
Launch Assumptions (15 launches per year)

Pricing (in year 4, in millions):

sELV: $1.50
mELV: $2.70
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)
1	0	0
2	0	0
3	0	0
4	6	0
5	9	2
6	10	4
7	10	5
8	10	5
9	10	5
10	10	5
11	10	5
12	10	5
13	10	5
14	10	5
15	10	5

Financial Assumptions

Revised: 13 Jan 93

General Assumptions		*Variable Name*
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	APAvgDays
Avg days in A/R:	0 days	ARAvgDays

Inflation Assumptions		
Inflation Rate:	4%	Inflation
Construction Inflation Rate	6%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions		
Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CapEngCost
General Requirements (% of Capital)	9%	CapGenReq
Contractor's Profit & Bonds (% of C	8%	CapContProfit
Contingencies (% of Capital):	15%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replcmt (% of Deprec'n):	30%	CapRepl

	Year 1	Year 2	Year 3	Year 4	Year 5	
Building Cost Phasing:	0%	30%	50%	20%	0%	PhaseBldg
Machinery Cost Phasing:	0%	20%	30%	30%	20%	PhaseMach
Engineering Cost Phasing:	30%	30%	20%	20%	0%	PhaseEng

Operating Cost Assumptions		
Operating Cost Mult (% of Cost):	100%	OperCostMult
Benefits (% of Salary):	40%	Benefits
Supplies (% of Salary):	10%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hilo (Per sf/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	5%	MaintMach

Debt/Equity Assumptions		
Leverage (Debt as a % of capital):	50%	Leverage
Long Term Interest Rate:	6.5%	InterestLong
Short Term Interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	8 yrs	TermShort

Depreciation Assumptions		
Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Eqpt Life (yrs):	7 yrs	DeskEqptLife
Salvage Value:	$0	DeskEqptSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Repl year	3 yr	CapReplYr
Startup %:	5%	CapReplPct
Life (yrs):	3 yrs	CapReplLife
Salvage Value:	$0	CapReplSalvage

Year: 1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation Multiplier:	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73

Launch Rate:

Rocket A (sELV):	0	0	0	6	9	10	10	10	10	10	10	10	10	10	10
Rocket B (mELV):	0	0	0	0	2	4	5	5	5	5	5	5	5	5	5

Pricing:

Rocket A, Per Launch:	0.00	0.00	0.00	1.50	1.56	1.62	1.69	1.75	1.82	1.90	1.97	2.05	2.13	2.22	2.31
Rocket B:	0.00	0.00	0.00	2.70	2.81	2.92	3.04	3.16	3.28	3.42	3.55	3.70	3.84	4.00	4.16

Income Statement:

Revenues:															
Launch:															
Rocket A:	0.00	0.00	0.00	9.00	14.04	16.22	16.87	17.55	18.25	18.98	19.74	20.53	21.35	22.20	23.09
Rocket B:	0.00	0.00	0.00	0.00	5.62	11.66	15.19	15.79	16.42	17.08	17.77	18.48	19.21	19.98	20.78
Total:	0.00	0.00	0.00	9.00	19.66	27.91	32.06	33.34	34.67	36.06	37.50	39.00	40.56	42.19	43.87
Expenses:															
Expenses, Fixed:															
Utilities:	0.00	0.01	0.09	0.29	0.54	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52
Rent:	0.00	0.00	0.00	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80
Maintenance:	0.02	0.60	1.60	2.34	2.72	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02
Insurance:	0.01	0.24	0.63	0.88	0.96	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42
Salaries, Bnfts, & S	0.00	0.31	1.21	3.23	5.40	7.74	10.26	10.67	11.10	11.54	12.01	12.49	12.99	13.51	14.05
Total:	0.04	1.16	3.54	7.91	10.84	13.62	16.67	17.34	18.03	18.75	19.50	20.28	21.09	21.94	22.81
Depreciation:	0.05	1.07	2.87	4.15	4.72	4.80	4.86	4.93	4.95	4.97	4.98	4.98	4.99	4.99	4.99
Total:	0.09	2.23	6.41	12.06	15.56	18.42	21.53	22.27	22.98	23.72	24.48	25.26	26.08	26.92	27.80
Earnings Before Int. & Taxes	-0.09	-2.23	-6.41	-3.06	4.10	9.49	10.53	11.07	11.69	12.34	13.02	13.74	14.49	15.26	16.07
Net Interest:															
Interest Income:	0.03	0.09	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Interest Expense:	0.07	0.89	2.28	2.96	2.89	2.74	2.58	2.41	2.23	2.04	1.84	1.62	1.39	1.14	0.88
Total:	-0.04	-0.80	-2.13	-2.78	-2.71	-2.56	-2.40	-2.23	-2.05	-1.86	-1.66	-1.44	-1.21	-0.96	-0.70
Earnings Before Taxes:	-0.13	-3.03	-8.54	-5.85	1.39	6.93	8.13	8.84	9.64	10.48	11.37	12.30	13.28	14.30	15.37
Taxes:	0.00	0.00	0.00	0.00	0.56	2.80	3.28	3.57	3.89	4.23	4.59	4.97	5.36	5.78	6.21
Net Profit:	-0.13	-3.03	-8.54	-5.85	0.83	4.13	4.84	5.27	5.75	6.25	6.77	7.33	7.91	8.52	9.16

Year: 1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Free Cash Flow Analysis:

Free Cash Flow:															
EBIT:	-0.09	-2.23	-6.41	-3.06	4.10	9.49	10.53	11.07	11.69	12.34	13.02	13.74	14.49	15.26	16.07
Less Taxes on EBIT:	0.00	0.00	0.00	0.00	-0.56	-2.80	-3.28	-3.57	-3.89	-4.23	-4.59	-4.97	-5.36	-5.78	-6.21
Net Op Profit Less Adj Taxe	-0.09	-2.23	-6.41	-3.06	3.54	6.69	7.25	7.50	7.80	8.11	8.43	8.77	9.12	9.49	9.86
Plus Depreciation:	0.05	1.07	2.87	4.15	4.72	4.80	4.86	4.93	4.95	4.97	4.98	4.98	4.99	4.99	4.99
Gross Cash Flow:	-0.04	-1.16	-3.54	1.09	8.26	11.49	12.11	12.44	12.75	13.08	13.41	13.76	14.11	14.48	14.85
Increase in Working Capital:	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus Capital Expend:															
Buildings:	1.16	17.02	28.77	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery:	0.00	4.25	6.83	6.90	4.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vehicles:	0.03	0.51	0.88	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Replacemer	0.00	0.00	0.32	0.86	1.25	1.42	1.44	1.46	1.48	1.49	1.49	1.49	1.50	1.50	1.50
Capital Cost Mult:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:	1.19	21.78	36.59	20.89	6.03	1.42	1.44	1.46	1.48	1.49	1.49	1.49	1.50	1.50	1.50
Gross Investment:	2.19	22.78	37.59	20.89	6.03	1.42	1.44	1.46	1.48	1.49	1.49	1.49	1.50	1.50	1.50
Free Cash Flow:	-2.22	-23.95	-41.13	-19.80	2.23	10.07	10.67	10.98	11.27	11.59	11.92	12.26	12.62	12.98	13.36
Cumulative Cash Flow:	-2.22	-26.17	-67.30	-87.10	-84.87	-74.80	-64.13	-53.15	-41.88	-30.28	-18.36	-6.10	6.52	19.50	32.86
Financial Flow:															
Financing Needed:	-2.28	-25.07	-44.15	-23.98	-1.97	5.83	6.36	6.80	7.04	7.29	7.55	7.81	8.08	8.36	8.64
- Consortium Equity:	-1.14	-12.54	-22.08	-11.99	-0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Outside Equity:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Increase in Debt:	-1.14	-12.54	-22.08	-11.99	-0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Debt:	1.14	12.54	22.08	11.99	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- A/P Increase:	0.00	0.09	0.20	0.36	0.24	0.23	0.25	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07
- AT Interest Income:	-0.04	-0.12	-0.20	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
+ AT Interest Expense:	0.05	0.58	1.51	1.96	1.91	1.81	1.71	1.59	1.48	1.35	1.21	1.07	0.92	0.76	0.58
+ A/R Decrease:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+ Principle Payments:	0.05	0.57	1.52	2.11	2.29	2.44	2.60	2.77	2.95	3.14	3.34	3.56	3.79	4.04	4.30
+ Dividends:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Financial Flow:	-2.22	-23.95	-41.13	-19.80	2.23	4.24	4.31	4.17	4.24	4.31	4.38	4.45	4.54	4.62	4.71

Average
Launch Assumptions (18 launches per year)

Pricing (in year 4, in millions):

sELV: $1.60
mELV: $2.85
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)
1	0	0
2	0	0
3	0	0
4	6	0
5	9	2
6	12	4
7	12	6
8	12	6
9	12	6
10	12	6
11	12	6
12	12	6
13	12	6
14	12	6
15	12	6

Financial Assumptions

Revised: 13 Jan 93

General Assumptions

		Variable Name
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	APAvgDays
Avg days in A/R:	0 days	ARAvgDays

Inflation Assumptions

Inflation Rate:	4%	Inflation
Construction Inflation Rate	6%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions

Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CapEngCost
General Requirements (% of Capital)	9%	CapGenReq
Contractor's Profit & Bonds (% of C	8%	CapContProfit
Contingencies (% of Capital):	12%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replcmt (% of Deprec'n):	20%	CapRepl

	Year 1	Year 2	Year 3	Year 4	Year 5	
Building Cost Phasing:	0%	30%	50%	20%	0%	PhaseBldg
Machinery Cost Phasing:	0%	20%	30%	30%	20%	PhaseMach
Engineering Cost Phasing:	30%	30%	20%	20%	0%	PhaseEng

Operating Cost Assumptions

Operating Cost Mult (% of Cost):	100%	OperCostMult
Benefits (% of Salary):	35%	Benefits
Supplies (% of Salary):	9%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hilo (Per sf/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	5%	MaintMach

Debt/Equity Assumptions

Leverage (Debt as a % of capital):	50%	Leverage
Long Term Interest Rate:	6.5%	InterestLong
Short Term Interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	6 yrs	TermShort

Depreciation Assumptions

Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Eqpt Life (yrs):	7 yrs	DeskEqptLife
Salvage Value:	$0	DeskEqptSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Repl year	3 yr	CapReplYr
Startup %:	5%	CapReplPct
Life (yrs):	3 yrs	CapReplLife
Salvage Value:	$0	CapReplSalvage

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation Multiplier:		1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73
Launch Rate:																
Rocket A (sELV):		0	0	0	6	9	12	12	12	12	12	12	12	12	12	12
Rocket B (mELV):		0	0	0	0	2	4	6	6	6	6	6	6	6	6	6
Pricing:																
Rocket A, Per Launch:		0.00	0.00	0.00	1.60	1.66	1.73	1.80	1.87	1.95	2.02	2.11	2.19	2.28	2.37	2.46
Rocket B:		0.00	0.00	0.00	2.85	2.96	3.08	3.21	3.33	3.47	3.61	3.75	3.90	4.06	4.22	4.39
Income Statement:																
Revenues:																
Launch:																
Rocket A:		0.00	0.00	0.00	9.60	14.98	20.77	21.60	22.46	23.36	24.29	25.27	26.28	27.33	28.42	29.56
Rocket B:		0.00	0.00	0.00	0.00	5.93	12.33	19.24	20.00	20.80	21.64	22.50	23.40	24.34	25.31	26.32
Total:		0.00	0.00	0.00	9.60	20.90	33.10	40.83	42.47	44.16	45.93	47.77	49.68	51.67	53.73	55.88
Expenses:																
Expenses, Fixed:																
Utilities:		0.00	0.01	0.09	0.29	0.54	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52
Rent:		0.00	0.00	0.00	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80
Maintenance:		0.02	0.60	1.60	2.34	2.72	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02
Insurance:		0.01	0.24	0.63	0.88	0.98	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42
Salaries, Bnfts, & S		0.00	0.30	1.18	3.08	5.16	7.40	9.81	10.20	10.61	11.03	11.47	11.93	12.41	12.90	13.42
Total:		0.04	1.15	3.49	7.76	10.60	13.28	16.21	16.86	17.54	18.24	18.97	19.72	20.51	21.33	22.19
Depreciation:		0.05	1.07	2.83	4.02	4.44	4.37	4.35	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37
Total:		0.09	2.22	6.32	11.78	15.04	17.65	20.56	21.23	21.90	22.60	23.33	24.09	24.88	25.70	26.56
Earnings Before Int. & Taxes		-0.09	-2.22	-6.32	-2.18	5.87	15.45	20.27	21.23	22.26	23.33	24.43	25.59	26.78	28.03	29.33
Net Interest:																
Interest Income:		0.03	0.09	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Interest Expense:		0.07	0.89	2.28	2.92	2.81	2.66	2.51	2.34	2.17	1.98	1.78	1.67	1.34	1.10	0.85
Total:		-0.04	-0.80	-2.13	-2.74	-2.63	-2.48	-2.33	-2.16	-1.99	-1.80	-1.60	-1.39	-1.16	-0.92	-0.67
Earnings Before Taxes:		-0.13	-3.02	-8.45	-4.93	3.24	12.96	17.94	19.07	20.27	21.53	22.83	24.20	25.62	27.11	28.66
Taxes:		0.00	0.00	0.00	0.00	1.31	5.24	7.25	7.70	8.19	8.70	9.22	9.77	10.35	10.95	11.58
Net Profit:		-0.13	-3.02	-8.45	-4.93	1.93	7.73	10.69	11.37	12.08	12.83	13.61	14.42	15.27	16.16	17.08

Year:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Free Cash Flow Analysis:																
Free Cash Flow:																
EBIT:		-0.09	-2.22	-6.32	-2.18	5.87	15.45	20.27	21.23	22.26	23.33	24.43	25.59	26.78	28.03	29.33
Less Taxes on EBIT:		0.00	0.00	0.00	0.00	-1.31	-5.24	-7.25	-7.70	-8.19	-8.70	-9.22	-9.77	-10.35	-10.95	-11.58
Net Op Profit Less Adj Taxe		-0.09	-2.22	-6.32	-2.18	4.56	10.21	13.02	13.53	14.07	14.63	15.21	15.81	16.44	17.08	17.75
Plus Depreciation:		0.05	1.07	2.83	4.02	4.44	4.37	4.35	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37
Gross Cash Flow:		-0.04	-1.15	-3.49	1.84	9.00	14.59	17.37	17.90	18.44	19.00	19.58	20.18	20.80	21.45	22.12
Increase in Working Capital:		1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus Capital Expend:																
Buildings:		1.16	17.02	28.77	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery:		0.00	4.25	6.63	8.90	4.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vehicles:		0.03	0.51	0.86	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Replacemer		0.00	0.00	0.21	0.57	0.80	0.89	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Capital Cost Mult:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:		1.19	21.78	36.48	20.60	5.59	0.89	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Gross Investment:		2.19	22.78	37.48	20.60	5.59	0.89	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Free Cash Flow:		-2.22	-23.93	-40.97	-18.76	3.41	13.70	16.50	17.03	17.57	18.13	18.71	19.31	19.93	20.58	21.24
Cumulative Cash Flow:		-2.22	-26.16	-67.13	-85.89	-82.48	-68.78	-52.28	-35.25	-17.68	0.44	19.15	38.46	58.39	78.96	100.21
Financial Flow:																
Financing Needed:		-2.28	-25.06	-43.98	-22.89	-0.67	9.58	12.31	12.97	13.44	13.94	14.45	14.97	15.52	16.08	16.66
- Consortium Equity:		-1.14	-12.53	-21.99	-11.44	-0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Outside Equity:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Increase in Debt:		-1.14	-12.53	-21.99	-11.44	-0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Debt:		1.14	12.53	21.99	11.44	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- A/P Increase:		0.00	0.09	0.19	0.35	0.23	0.22	0.24	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07
- AT Interest Income:		-0.04	-0.12	-0.20	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
+ AT Interest Expense:		0.05	0.58	1.50	1.93	1.85	1.76	1.66	1.55	1.43	1.31	1.18	1.04	0.89	0.73	0.56
+ A/R Decrease:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+ Principle Payments:		0.05	0.57	1.51	2.09	2.24	2.38	2.54	2.70	2.88	3.08	3.26	3.47	3.70	3.94	4.20
+ Dividends:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Financial Flow:		-2.22	-23.93	-40.97	-18.76	3.41	4.12	4.19	4.06	4.12	4.19	4.26	4.33	4.41	4.50	4.59

Optimistic
Launch Assumptions (22 launches per year)

Pricing (in year 4, in millions):

sELV: $1.70
mELV: $3.00
Annual Launch Price Increase: 4%

Launch Rates:

Year	Vehicle A (sELV)	Vehicle B (mELV)	Vehicle C (mELV)
1	0	0	0
2	0	0	0
3	0	0	0
4	6	0	0
5	9	2	0
6	12	4	2
7	12	5	4
8	12	5	5
9	12	5	5
10	12	5	5
11	12	5	5
12	12	5	5
13	12	5	5
14	12	5	5
15	12	5	5

Financial Assumptions

Revised: 13 Jan 93

General Assumptions		*Variable Name*
Start Year:	1992	YrStart
Bank Interest Rate:	6%	InterestBank
Avg days in A/P:	30 days	APAvgDays
Avg days in A/R:	0 days	ARAvgDays

Inflation Assumptions		
Inflation Rate:	4%	Inflation
Construction Inflation Rate	6%	InflationConstruction
O&M Inflation Rate:	4%	InflationOM
Insurance Inflation Rate:	4%	InflationInsurance
Salary Inflation Rate:	4%	InflationSalary

Capital Cost Assumptions		
Capital Cost Mult (% of Estimate):	100%	CapCostMult
Engineering Costs (% of Capital):	10%	CapEngCost
General Requirements (% of Capital)	9%	CapGenReq
Contractor's Profit & Bonds (% of C	8%	CapContProfit
Contingencies (% of Capital):	10%	CapContingency
Vehicle Cost (% of Bldg Cost):	3%	VehicleCost
Capital Replcmt (% of Deprec'n):	15%	CapRepl

	Year 1	Year 2	Year 3	Year 4	Year 5	
Building Cost Phasing:	0%	30%	50%	20%	0%	PhaseBldg
Machinery Cost Phasing:	0%	20%	30%	30%	20%	PhaseMach
Engineering Cost Phasing:	30%	30%	20%	20%	0%	PhaseEng

Operating Cost Assumptions		
Operating Cost Mult (% of Cost):	100%	OperCostMult
Benefits (% of Salary):	30%	Benefits
Supplies (% of Salary):	8%	Supplies
Insurance Costs (% of Capital):	1%	Insurance
Lease, Offices in Hilo (Per sf/Mo.):	$1.00	LeaseOffice
Maint of Bldgs (% of Capital):	2%	MaintBldg
Maint of Mach (% of Capital):	5%	MaintMach

Debt/Equity Assumptions		
Leverage (Debt as a % of capital):	50%	Leverage
Long Term Interest Rate:	6.5%	InterestLong
Short Term Interest Rate:	6.0%	InterestShort
Long Borrowing Term:	15 yrs	TermLong
Short Borrowing Term:	8 yrs	TermShort

Depreciation Assumptions		
Building Life (yrs):	30 yrs	BldgLife
Salvage Value:	$0	BldgSalvage
Machinery Life (yrs):	15 yrs	MachLife
Salvage Value:	$0	MachSalvage
Desk Eqpt Life (yrs):	7 yrs	DeskEqptLife
Salvage Value:	$0	DeskEqptSalvage
Vehicle Life (yrs):	3 yrs	VehicleLife
Salvage Value:	$0	VehicleSalvage
Capital Repl year	3 yr	CapReplYr
Startup %:	5%	CapReplPct
Life (yrs):	3 yrs	CapReplLife
Salvage Value:	$0	CapReplSalvage

Year: 1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Inflation Multiplier:	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73

Launch Rate:

Rocket A (sELV):	0	0	0	6	9	12	12	12	12	12	12	12	12	12	12
Rocket B (mELV):	0	0	0	0	2	4	5	5	5	5	5	5	5	5	5
Rocket C:	0	0	0	0	0	2	4	5	5	5	5	5	5	5	5

Pricing:

Rocket A, Per Launch:	0.00	0.00	0.00	1.70	1.77	1.84	1.91	1.99	2.07	2.15	2.24	2.33	2.42	2.52	2.62
Rocket B:	0.00	0.00	0.00	3.00	3.12	3.24	3.37	3.51	3.65	3.80	3.95	4.11	4.27	4.44	4.62
Rocket C:	0.00	0.00	0.00	3.00	3.12	3.24	3.37	3.51	3.65	3.80	3.95	4.11	4.27	4.44	4.62

Income Statement:

Revenues:															
Launch:															
Rocket A:	0.00	0.00	0.00	10.20	15.91	22.06	22.95	23.87	24.82	25.81	26.85	27.92	29.04	30.20	31.40
Rocket B:	0.00	0.00	0.00	0.00	6.24	12.98	16.87	17.55	18.25	18.98	19.74	20.53	21.35	22.20	23.09
Rocket C:	0.00	0.00	0.00	0.00	0.00	6.49	13.50	17.55	18.25	18.98	19.74	20.53	21.35	22.20	23.09
Total:	0.00	0.00	0.00	10.20	22.15	41.53	53.32	58.98	61.32	63.77	66.32	68.98	71.73	74.60	77.59
Expenses:															
Expenses, Fixed:															
Utilities:	0.00	0.01	0.09	0.29	0.54	0.79	1.11	1.16	1.20	1.25	1.30	1.35	1.41	1.46	1.52
Rent:	0.00	0.00	0.00	1.17	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.67	1.73	1.80
Maintenance:	0.02	0.60	1.60	2.34	2.72	2.83	2.94	3.06	3.18	3.31	3.44	3.57	3.72	3.87	4.02
Insurance:	0.01	0.24	0.63	0.88	0.96	1.00	1.04	1.08	1.13	1.17	1.22	1.27	1.32	1.37	1.42
Salaries, Bnfts, & S	0.00	0.28	1.11	2.94	4.92	7.05	9.36	9.73	10.12	10.52	10.95	11.38	11.84	12.31	12.81
Total:	0.04	1.14	3.43	7.62	10.36	12.94	15.76	16.39	17.05	17.73	18.44	19.18	19.94	20.74	21.57
Depreciation:	0.05	1.07	2.81	3.95	4.30	4.18	4.12	4.12	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Total:	0.09	2.21	6.25	11.58	14.66	17.11	19.88	20.52	21.16	21.84	22.55	23.29	24.06	24.85	25.68
Earnings Before Int. & Taxes	-0.09	-2.21	-6.25	-1.38	7.49	24.42	33.44	38.44	40.16	41.93	43.77	45.69	47.68	49.75	51.90
Net Interest:															
Interest Income:	0.03	0.09	0.15	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Interest Expense:	0.07	0.88	2.27	2.89	2.75	2.61	2.46	2.30	2.12	1.94	1.75	1.54	1.31	1.08	0.83
Total:	-0.04	-0.79	-2.12	-2.71	-2.57	-2.43	-2.28	-2.12	-1.94	-1.76	-1.57	-1.36	-1.13	-0.90	-0.65
Earnings Before Taxes:	-0.13	-3.00	-8.37	-4.09	4.91	21.99	31.16	36.33	38.21	40.17	42.21	44.33	46.54	48.85	51.26
Taxes:	0.00	0.00	0.00	0.00	1.98	8.88	12.59	14.67	15.44	16.23	17.05	17.91	18.80	19.74	20.71
Net Profit:	-0.13	-3.00	-8.37	-4.09	2.93	13.11	18.57	21.65	22.77	23.94	25.16	26.42	27.74	29.12	30.55

Year: 1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ref.Yrs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Free Cash Flow Analysis:

Free Cash Flow:															
EBIT:	-0.09	-2.21	-6.25	-1.38	7.49	24.42	33.44	38.44	40.16	41.93	43.77	45.69	47.68	49.75	51.90
Less Taxes on EBIT:	0.00	0.00	0.00	0.00	-1.98	-8.88	-12.59	-14.67	-15.44	-16.23	-17.05	-17.91	-18.80	-19.74	-20.71
Net Op Profit Less Adj Taxe	-0.09	-2.21	-6.25	-1.38	5.50	15.54	20.85	23.77	24.72	25.70	26.72	27.78	28.88	30.02	31.20
Plus Depreciation:	0.05	1.07	2.81	3.95	4.30	4.18	4.12	4.12	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Gross Cash Flow:	-0.04	-1.14	-3.43	2.58	9.81	19.71	24.97	27.89	28.83	29.81	30.83	31.89	32.99	34.13	35.31
Increase in Working Capital:	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus Capital Expend:															
Buildings:	1.16	17.02	28.77	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery:	0.00	4.25	6.63	6.90	4.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vehicles:	0.03	0.51	0.86	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Replacemer	0.00	0.00	0.16	0.42	0.59	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Capital Cost Mult:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:	1.19	21.78	36.43	20.45	5.37	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Gross Investment:	2.19	22.78	37.43	20.45	5.37	0.65	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Free Cash Flow:	-2.22	-23.92	-40.86	-17.87	4.43	19.07	24.34	27.28	28.22	29.20	30.22	31.27	32.37	33.51	34.69
Cumulative Cash Flow:	-2.22	-26.14	-67.01	-84.88	-80.45	-61.38	-37.04	-9.76	18.45	47.65	77.87	109.14	141.51	175.02	209.71
Financial Flow:															
Financing Needed:	-2.28	-25.04	-43.86	-21.95	0.43	16.03	20.23	23.29	24.17	25.09	26.04	27.02	28.04	29.10	30.19
- Consortium Equity:	-1.14	-12.52	-21.93	-10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Outside Equity:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Increase in Debt:	-1.14	-12.52	-21.93	-10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Debt:	1.14	12.52	21.93	10.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- A/P Increase:	0.00	0.09	0.19	0.34	0.23	0.21	0.23	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07
- AT Interest Income:	-0.04	-0.12	-0.20	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
+ AT Interest Expense:	0.05	0.58	1.50	1.91	1.82	1.72	1.62	1.52	1.40	1.28	1.15	1.01	0.87	0.71	0.55
+ A/R Decrease:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+ Principle Payments:	0.05	0.57	1.51	2.06	2.20	2.34	2.49	2.66	2.83	3.01	3.21	3.42	3.64	3.87	4.13
+ Dividends:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Financial Flow:	-2.22	-23.92	-40.86	-17.87	4.00	4.03	4.11	3.98	4.04	4.11	4.18	4.25	4.33	4.41	4.50

SPACEPORT-BENEFIT
OR
TRAGEDY

BY
WILLIAM FREDERICK HACHMEISTER
OCTOBER 20, 1993

NOVEMBER 18, 1993.

PSA

HAWAI'I COUNTY COUNCIL MAKES HISTORY!

NASA'S SECRET PROJECTS NOW REVEALED?

INVESTIGATION BY CHAIR KEOLA CHILDS, SUB-COMMITTEE ON THE PALIMA POINT, HAWAI'I SPACEPORT PROPOSAL COMPLETED, AND FOUND THE CONCEPTUAL PROPOSAL TO BE A DANGER TO THE ISLAND OF HAWAI'I. THE FULL COUNTY COUNCIL REJECTED IN A VOTE 9 - 0 TO COMPLETELY ABANDON THE dEIS PROCESS IMMEDIATELY.

DOCUMENTARY OF THE RISKS, AND HAZARDS IS SHOWING ON OLELO TELEVISION:

FRIDAY 11/19 AT 4:30 PM
SATURDAY 11/20 AT 12:00 NOON
MONDAY 11/22 AT 8:00 AM
THURSDAY 11/25 AT 9:00 AM
(THANKS GIVING DAY)
TUESDAY 11/30 AT 10:30 PM

BY WILLIAM FREDERICK HACHMEISTER
I SUPPORT THE BAN OF SPACE NUCLEAR POWER SOURCES WORLD-WIDE.

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Datebook

Spaceport film

A documentary on the risks and hazards of spaceport facilities, proposed for Ka'u, will be shown on Jones Spacelink at 9:30 tonight; 4:30 p.m. tomorrow; 3:30 p.m. Sunday; and 7:30 p.m. Monday.

SPACEPORT-BENEFIT
OR
TRAGEDY

BY
WILLIAM FREDERICK HACHMEISTER
OCTOBER 20, 1993

ISSUES:

1. REPRISALS FOR A WHISTLE-BLOWER.

2. NASA SPACE SHUTTLE CHALLENGER TRAGEDY.

3. SPACE NUCLEAR POWER - NUCLEAR PROPULSION.

4. SPACEPORT PROPOSAL PALIMA POINT, HAWAII.

"HOW REAL IS TIME?

WILL IT EVER COME TO AN END?

WHERE DOES THE DIFFERENCE BETWEEN THE PAST AND THE FUTURE COME FROM?

WHY DO WE REMEMBER THE PAST BUT NOT THE FUTURE?

IF WE FIND THE ANSWERS AS TO WHY IT IS THAT WE AND THE UNIVERSE EXIST,

IT WOULD BE THE ULTIMATE TRIUMPH,

FOR THEN WE WOULD KNOW THE MIND OF GOD".

STEPHEN HAWKING

DESCRIPTIONS OF SHUTTLE SYSTEMS AND FUELS:

ET: EXTERNAL TANK.

LH2: LIQUID HYDROGEN FUEL.

LOX: LIQUID OXYGEN FUEL.

SRB: SOLID ROCKET MOTOR.

SSME: SPACE SHUTTLE MAIN ENGINE

Seated in the simulator middeck are S. Christa McAuliffe, Gregory B. Jarvis, and Ronald E. McNair. Standing left is the backup teacher in space, Barbara R. Morgan. At launch, Christa McAuliffe occupied the center seat and Greg Jarvis the right-hand seat. (NASA)

39, mission specialist from Kealakekua, Kona, Hawaii, an aerospace engineer with a master's degree. He had served as a flight engineering instructor at the Air Force Test Pilot School, and had taken part in checking out the first two orbital test flights of the shuttle. He was the first American of Japanese descent to become a member of a flight crew.

On *Challenger*'s middeck, the left-hand seat was occupied by Ronald E. McNair, Ph.D., 35, mission specialist from Lake City, South Carolina. He was a physicist with a bachelor of science degree from North Carolina A & M University and a doctorate from the Massachusetts Institute of Technology. He had become the second black astronaut to fly in space as a member of the crew of *Challenger* 41-B, February 3–11, 1984. This was his second mission.

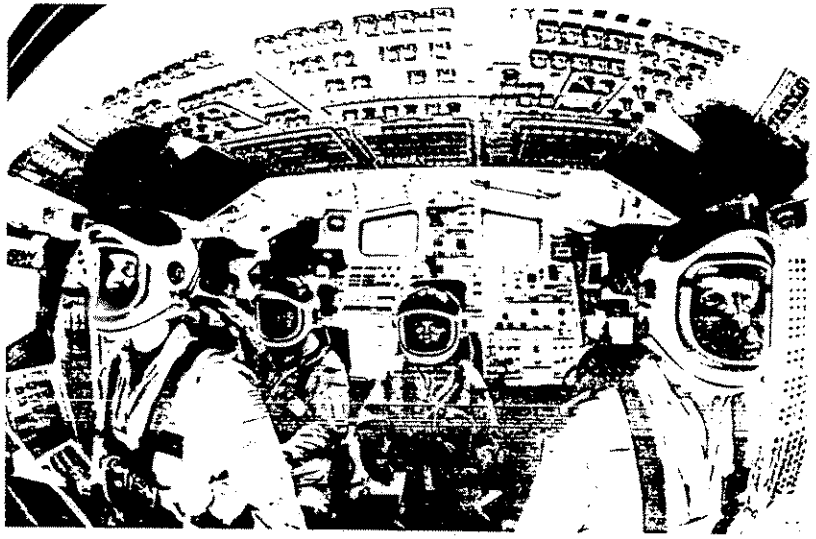
The middeck right-hand seat was occupied by Gregory B. Jarvis, 41, a payload specialist from Detroit. He was assigned to the mission as a technical expert from the Hughes Aircraft Company to operate experiments on the behavior of fluids in microgravity (the so-called zero g). The results were expected to be useful in the design of advanced liquid propulsion systems Hughes named its new multiple satellite launcher for him.

The middeck center seat was occupied by NASA's teacher in space, Sharon Christa Corrigan McAuliffe, a native of Boston with a master's degree in education. The Teacher-in-Space Program had been proposed by President Reagan who proclaimed it a means of communicating to the nation's schoolchildren (and to their parents) the nature and potential value of the new frontier the American space establishment was exploring.

[illegible] test pilot schools of [illegible] They appeared to express the Anglo-Saxon/North European phenotype that had been predominant in the Corps of Astronauts since its inception.

However, [illegible] the space agencies' ethnic predominance [illegible] gender ratio that was more [illegible] American melting pot [illegible] 1980s. In these respects [illegible] accomplished the diversity of American society more than [illegible] any other flight team.

The alt-center seat on the night deck was occupied by Judith A. Resnik, Ph.D., [illegible] flight engineer. A mission specialist, she was a graduate in electrical engineering of Carnegie Mellon University, Pittsburgh, and had been awarded [illegible] that field from the University [illegible] the second American woman [illegible] 144 hours and 57 minutes [illegible] 41-D, the first flight of the [illegible] August 30–September 5, 1984. The alt middeck seat was occupied by Air Force Lieutenant Colonel Ellison S. Onizuka,



Seated in the [illegible] launch were [illegible] Resnik, [illegible] Onizuka, [illegible]

OCTOBER 20, 1993. BY WILLIAM FREDERICK HACHMEISTER.

FADE IN: 10 SECONDS OF SLAT, 60 SECONDS OF COLOR BAR, 10 SECONDS OF COUNT-DOWN, 2 SECONDS OF BLACK.

SCENE: SUB TITLE DIALOGUE OF THE ASTRONAUTS IS RE-ENACTMENT.

SCENE: STILL FRAME: SETTING, CABIN OF THE NASA SPACE SHUTTLE CHALLENGER.

LYING NEARLY SUPINE IN THEIR SEATS, BOTH SCOBEE AND SMITH LOOKED OUT AT A BRIGHT BLUE SKY, AND BEYOND IT A HAZY SEA.

SCENE: STILL PICTURE OF THE SHUTTLE'S CABIN. IDENTIFY SMITH, SCOBEE, RESNIK, AND ONIZUKA.

SMITH: THESE CLOUDS LOOK LIKE THEY'RE GOING AWAY FROM US UP HERE.

SCOBEE: I THINK THEY ARE. LOOKS GOOD OVER THIS WAY.

SMITH: WOW! BOY! THE SUN FEELS GOOD THIS MORNING.

CARTER, ASTRONAUT SUPPORT PERSON. CARTER: YOU SHOULD HAVE BEEN HERE AT 2 A.M.

MOBILE LAUNCH PLATFORM. SCOBEE: ICE SKATING ON THE MLP? YOU GUYS UP HERE WORKING?

CARTER: IT'S A LOT OF FUN.

SCOBEE: WINDS OUT OF THE NORTH BLOWING PRETTY STRONG, LOOKS LIKE.

SMITH: THEY ARE OR AREN'T.

SCOBEE: THEY'RE NOT. THE ANEMOMETER ISN'T GOING AROUND, AND THE ARROW'S POINTED IN THE RIGHT DIRECTION.

LOX, LIQUID-OXYGEN.
T MINUS 1:47. SMITH: OKAY THERE GOES THE LOX ARM.

SCOBEE: GOES THE BEANIE CAP.

ONIZUKA: DOESN'T IT GO THE OTHER WAY? (LAUGHTER)

SMITH: GOD, I HOPE NOT, ELLISON.

T MINUS 0:59. SCOBEE: ONE MINUTE DOWNSTAIRS.

SMITH: ULLAGE PRESSURES ARE UP.

T MINUS 0:30. SCOBEE: THIRTY SECONDS DOWN THERE.

T MINUS 0:15. SCOBEE: FIFTEEN.

T MINUS 0:06. SCOBEE: THERE THEY GO GUYS.

RESNIK: ALL RIGHT.

SCOBEE: THREE AT A HUNDRED.

SCENE: VIDEOTAPE MCC: WE HAVE MAIN ENGINE START, 3, 2, 1.

MCC: LIFTOFF! LIFTOFF OF THE TWENTY-FIFTH SPACE SHUTTLE MISSION AND IT HAS CLEARED THE TOWER! MCC: WATCH YOUR ROLL, CHALLENGER.

HOUSTON: PAO: ... ROLL PROGRAM CONFIRMED.

SCENE: ON THE FLIGHT DECK.

T PLUS 0:11. SMITH: GO, YOU MOTHER.

RESNIK: LVLH.

T PLUS 0:15. RESNIK: SHIT HOT!

SCOBEE: OOOH KAAY.

SMITH: LOOKS LIKE WE'VE GOT A LOT OF WIND UP HERE TODAY.

SCOBEE: YEAH.

SCOBEE: IT'S HARD TO SEE OUT MY WINDOW HERE.

SMITH: THERE'S 10,000 FEET AND MACH POINT FIVE.

SCOBEE: POINT NINE.

SMITH: THERE'S MACH ONE.

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SCOBEE: GOING THROUGH 19,000 FEET.

T PLUS 0:43. SCOBEE: OKAY, WE'RE THROTTLING DOWN.

SCOBEE: THROTTLING UP.

SMITH: THROTTLE UP.

T PLUS 0:59. SCOBEE: ROGER.

SMITH: THIRTY-FIVE THOUSAND. GOING THROUGH ONE POINT FIVE.

SCOBEE: READING 486 ON MINE.

SMITH: YEP. THAT'S WHAT I'VE GOT, TOO.

MCC, HOUSTON: GO AT THROTTLE UP.

T PLUS 1:10. SCOBEE: ROGER, GO AT THROTTLE UP.

T PLUS 1:13. SMITH: UHH...OH!

SCENE: PORTRAIT OF ASTRONAUTS.

I DEDICATE THIS VIDEO TO ALL THE LAST ACTION HEROS OF THE NASA SPACE SHUTTLE CHALLENGER MALFUNCTION, AND TO THOSE WHO DIED AS A RESULT OF SCUD MISSILE ATTACKS DURING THE PERSIAN GULF WAR.

IN 1988 I WAS OFFERED A LUCRATIVE BUSINESS DEAL IF I CLAIMED THAT MY WRITTEN ASSERTIONS TO BOTH SENATOR DANIEL INOUYE OF HAWAII AND NASA'S INSPECTOR GENERAL CONCERNING TELEDYNE MICRO ELECTRONIC'S FRAUD IN QUALITY ASSURANCE OF AEROSPACE FLIGHT COMPUTERS WAS A WORK OF FICTION. THE STATE OF HAWAII FILM BOARD HAD ARRANGED FOR AND WAS A PARTY TO THE NEGOTIATIONS WHICH I REFUSED TO ACCEPT.

SCENE: STILL PICTURE OF JULIAN AND FELIX.

I HAVE NOT SEEN NOR TALKED WITH MY TWO YOUNG CHILDREN FOR OVER FOUR YEARS, 14 MONTHS OF WHICH I SPENT IN JAIL IN HILO HAWAII, AND WAS RELEASED AFTER IT WAS DETERMINED MY CIVIL RIGHTS HAD BEEN VIOLATED. I HAD BEEN CHARGED WITH CHILD INTERFERENCE ON TWO COUNTS FOR TAKING MY SONS, ONE AND THREE YEARS OF AGE, TO DENVER, COLORADO FOR THEIR PROTECTION. THIS WAS AT THE SUGGESTION OF BOTH MY DIVORCE ATTORNEY IN HAWAII AND THE NASA INVESTIGATOR WITH WHOM I WAS WORKING TO RESOLVE THE NASA RELATED ISSUES. MY THREE YEAR OLD HAD BEEN RAPED BY A RELATIVE, AND A CONFESSION HAD BEEN GIVEN BY THE YOUNG MOLESTER TO STATE OF HAWAII CHILD PROTECTIVE SERVICE REPRESENTATIVES. HOWEVER, I HAD BEEN WARNED BY STATE CPS AND OTHERS THAT IF I DID NOT STOP MY WORK WITH THE NASA INVESTIGATORS, THAT THE FAMILY COURT JUDGE WOULD ORDER PERMANENT CUSTODY TO MY ESTRANGED WIFE WHO WAS LIVING IN THE HOME WHERE THE RAPE TOOK PLACE. OTHER REASONS THE STATE USED WERE: MY VOICE IS NOT MASCULINE, I'M AN EX-MARINE WHO SERVED IN VIETNAM. LATER, JUDGE FLORENDO ORDERED MY CHILDREN TO RESIDE IN MY WIFE'S CARE.

PAGE 4.

WHILE INCARCERATED I WAS FORCED TO STAND TRIAL WITHOUT REPRESENTATION IN FAMILY COURT MATTERS WHERE THE TESTIMONY I WOULD GIVE COULD BE USED AGAINST ME IN ONGOING CRIMINAL ISSUES. THE LEGAL FIRMS I CONTACTED IN HAWAII HAVE LIED TO ME, AND DENIED JUSTICE BY TURNING THEIR BACKS ON THESE ISSUES. SOME SUGGESTED THAT I FORGET MY CHILDREN AND START ANOTHER FAMILY. METHODS OF BRAIN WASHING HAVE BEEN USED ON ME, AND THERE HAVE BEEN ATTEMPTS ON MY LIFE. THIS SCRIPT WILL FOCUS ON SPACEPORT MATTERS, THE OTHER ISSUES WILL FOLLOW IN ANOTHER SCRIPT.

SCENE: AFTER THE SHUTTLE VAPORIZES.

THE SHUTTLE VAPORIZES, ITS ASCENT PLUME TRAIL IS VISIBLE, AS ARE THE DESCENT TRAILS OF THE CABIN AND OTHER OBJECTS. BOTH SRB'S CONTINUE TO ASCEND. VAPORIZATION OF THE SHUTTLE CAUSED ALL STANDARD ELECTRONIC POWER TO BE INSTANTLY LOST ABOARD THE CHALLENGER. ONLY CHRISTA MCAULIFFE'S SMUGGLED ABOARD BATTERY OPERATED TAPE RECORDER CONTINUED TO OPERATE, RECORDING THE VOICES OF THE ASTRONAUTS AND OTHER AMBIENT SOUNDS AS THE CABIN DESCENDED. THERE WERE SURVIVORS. AS TOLD TO ME BY NASA REPRESENTATIVE MR. LARRY MULLER, THEY WERE IN ALL PROFESSIONAL CONSCIOUSNESS EMPLOYING MEANS OF EMERGENCY SURVIVAL, AND TAKING INVENTORY OF THEIR CRIPPLED SPACE CRAFT. ALL EMERGENCY OXYGEN BOTTLES WERE TURNED ON.

SCENE: VIDEOTAPE MOMENTS PRIOR TO CABIN ENTRY INTO THE OCEAN. THE ASTRONAUTS PREPARE THEMSELVES FOR THE OCEAN ENTRY AFTER SPLASH DOWN.

BACKGROUND:

NARRATING FOR WILLIAM FREDERICK HACHMEISTER - MACHTELD KRIJGSMAN.

I WORKED FOR TELEDYNE MICRO ELECTRONICS FROM APRIL 1986 TO FEBRUARY 1987. MY POSITION WAS SENIOR TEST TECHNICIAN FOR THE NASA LAUNCH VEHICLES. MY EMPLOYER'S COMPUTERS WERE RESPONSIBLE FOR BOTH THE LIQUID FUEL CONTROL AND GUIDANCE SYSTEMS OF THE NASA MANNED AND UNMANNED LAUNCH VEHICLES FROM GROUND LAUNCH TO ORBITAL PLACEMENT.

PAGE 5.

MY DUTIES INCLUDED: TESTING, AND INVESTIGATING ALL COMPUTER MODULE FAILURES TO DETERMINE THE EXACT CAUSE OF ANY GIVEN MALFUNCTION (HUMAN, ELECTRONIC, OR ACT OF NATURE), OTHERWISE KNOWN AS SYSTEM SUSTAINING ENGINEER. IN ALL PROFESSIONS SYSTEM SUSTAINING IS A DIMENSION OF ITS OWN, AND REQUIRES STRICT DISCIPLINE. I WAS VERY PROUD TO BECOME A TRUSTED MEMBER OF TELEDYNE'S ELITE TEAM, AFTER BEING INTERVIEWED BY THE REPRESENTATIVES OF BOTH NASA AND THE DEPARTMENT OF DEFENSE REPRESENTATIVES (DOD), WHO HAD THE FINAL ACCEPTANCE.

SCENE: STILL OF SCI COMPUTER MODULE.

EXAMPLE OF WHAT A MODULE LOOKS LIKE. THESE SYSTEMS WERE COSTLY. I WAS INFORMED THEY RANGED IN PRICE FROM $10,000 TO 30,000 DOLLARS EACH, AND TELEDYNE RECEIVED BILLIONS OF DOLLARS EACH YEAR ON CONTRACTS FOR SUCH AS THESE. THEY WERE SAID TO BE OF HIGH RELIABILITY, AFTER ALL THEY WERE RESPONSIBLE FOR THE SAFETY OF THE LAUNCH, WHICH WAS ABOVE ALL IN THE INTEREST OF OUR NATION.

I SOON LEARNED THAT THESE MODULES WERE ALLOWED INTO SERVICE EVEN THOUGH SOME HAD FAILED TESTS, AND NO FAILURE ISOLATION WAS BEING PERFORMED. TELEDYNE'S POSITION WAS: AFTER SALE TO NASA THE MODULES WOULD BE FOUND FAILED AND RETURNED FOR REPAIR AT FURTHER CHARGE, KNOWN AS NOURISHING THE ACCOUNT. I REFUSED TO COMPLY WITH ORDERS THAT WOULD HAVE INVOLVED ME IN AEROSPACE FRAUD, AND I STARTED COMPLAINING TO MANAGEMENT BY WAY OF THE CHAIN OF COMMAND. AT ALL LEVELS I WAS ORDERED TO PASS INTO SERVICE THOSE MODULES THAT HAD FAILED TESTS. THE PRESIDENT OF THE MANUFACTURING DIVISION TOLD ME: NORMALLY, DOING THE RIGHT THING IS WHAT IS EXPECTED, BUT IN THIS CASE I WAS NOT DOING WHAT TELEDYNE WANTED. THE REASON FOR MY LAYOFF WAS "TELEDYNE HAD LOST THE CONTRACT" I WAS A PART OF. THE REAL REASON FOR MY LAY-OFF, I BLEW THE WHISTLE ON MY EMPLOYER WHO WAS DOING THE UN-THINKABLE "FALSE TESTING ON CRITICAL FLIGHT COMPUTERS."

PAGE 6.

SHORTLY AFTERWARDS I WAS INTERVIEWED BY TELEDYNE'S SECURITY DIVISION AND WARNED NOT TO REVEAL WHAT I KNEW ABOUT THE PASSING OF COMPUTER MODULES THAT HAD FAILED TESTS. NOT LONG AFTER THAT I WAS INFORMED BY THE DOD AGENT THAT THE LIVES OF MY FAMILY AND MYSELF WERE IN PHYSICAL DANGER.

SCENE: <u>STILL PICTURE</u>

SIGNATURES OF THE PRESIDENTIAL COMMISSION. THE CHALLENGER INVESTIGATION I CONTINUED IN PRIVATE AND ON MY OWN. IN 1989, NASA'S ADMINISTRATOR JAMES FLETCHER HAD REVIEWED MY WRITTEN INFORMATION, AND WAS BRIEFED BY NASA SPECIAL AGENTS AFTER THEIR INTERVIEWS WITH ME. IN ORDER TO FORMALLY CONFIRM MY TESTIMONY CONCERNING TELEDYNE AND THE CHALLENGER DISASTER HE HAD TO RESEAT THE ROGERS COMMISSION HOWEVER, THE BUSH ADMINISTRATION DENIED HIS REQUEST. SHORTLY AFTER THAT DENIAL MR. FLETCHER RESIGNED AS NASA ADMINISTRATOR. DAYS BEFORE MR. FLETCHER'S DEATH A TRIAL WAS HEARD, AN FAILED TO RELEASE, THE AUDIOTAPE THAT ASTRONAUT MCAULIFFE HAD RECORDED FROM LAUNCH TO THEIR DEMISE. AN ATTEMPT ON MY LIFE WAS MADE JUST BEFORE MR. FLETCHER'S DEATH.

SCENE: <u>VIDEOTAPE</u> HEREIN ARE MY FINDINGS.

SMOKE DEVELOPING AT THE AFT PORTION OF THE SRB. TELEDYNE ANALYSIS SHOULD BE INTERESTED IN THE FOLLOWING: IT IS NOT CLEARLY EVIDENT THAT THE O-RING OF THE LEFT SOLID ROCKET BOOSTER HAD FAILED, THE BLACK SMOKE YOU SEE ON THE SCREEN COULD VERY WELL BE BURNING HYDRAULIC FLUID. THE MYSTERIOUS BLACK PUFFS, WHY DID THE SMOKE TRAVEL UPWARDS, AFTER ALL THE SHUTTLE IS ASCENDING, THEREFORE THE BLACK SMOKE SHOULD BELLOW DOWNWARD. TESTS CAN BE PERFORMED TO DETERMINE IF THE COLOR OF SMOKE IS THAT OF RUBBER O-RINGS, OR HYDRAULIC FLUIDS.

PAGE 6A.

I ALSO SUGGEST RUBBER O-RINGS BE FASTEN TO THE SAME EXTERNAL POSITION ON THE SRB IN SOME FUTURE MISSION, SET TO FIRE AT LIFT-OFF TO DETERMINE THE DIRECTION OF SMOKE, AND COLOR COMPARISON STUDY. LOSS OF HYDRAULICS COULD HAVE BEEN WHY THE VEHICLE FLEW AN AWKWARD ASCENT.

PAGE 7.

SCENE: VIDEOTAPE PATCHES OF LH2 IN PLUMES. DOES THE FLAME IN THE V POINT OF THE PLUMES MEAN THE LIQUID HYDROGEN IS ALREADY IN FAILURE? NOTICE HOW IT DANCES, AND ROLLS OFF THE OUTER EDGE OF THE PLUME. WHY DID THE FLAME MOVE SO RADICALLY? BECAUSE THE SHUTTLE WAS EXPERIENCING GUIDANCE PROBLEMS. THIS WILL BE MORE CLEAR TO YOU LATER.

SCENE: VIDEOTAPE NASA'S FINDING OF THE ROLLING FLAMES.

SCENE: VIDEOTAPE FLAME IS OBSERVED AT THE AFT SECTION OF THE LEFT SRB.

CHAIRMAN EDWARD C. (PETE) ALDRIDGE, JR. AND DIRECTORS OF THE AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA) INTERVIEWED ME A YEAR AGO. DURING HIS INVESTIGATION HE QUESTIONED ME AS TO WHAT TIME PERIOD THIS FLAME IS FIRST OBSERVED. I INFORMED THE GROUP THAT I DID NOT HAVE AN ACCURATE TIME. HE THEN TOLD ME IT WAS JUST AFTER T PLUS 0:59, JUST AFTER THE THROTTLE UP COMMAND, THE ACCURATE TIME WAS 0:587. HE ALSO INFORMED ME THAT NASA RANGE CONTROLLERS NEVER ALERTED THE SHUTTLE'S CREW TO THIS ANOMALY.

SCENE: STILL OF RECIRCULATION BLUE PRINT, POINT OUT THE SYSTEM.

THE RECIRCULATION PLUMBING AND THE BROKEN AREA WHERE THE LH2 ESCAPED, AND TO WHERE THE FLAME FROM THE AFT SRB RETURNS. T PLUS 1:13 UPPER RIGHT SECTION OF THE CHALLENGER. AT THE FINAL COMMAND "GO AT THROTTLE UP", THE DAMAGE TO THE RECIRCULATION PLUMBING BECAME CRITICAL, PROBABLY THE LH2 CAUSED THE TURBO PUMPS TO SHUT DOWN AS THE FLAMING LH2 STREAM WITHDREW INTO THE SHUTTLE'S BELLY. THE FLAME GROWS FOLLOWING THE RECIRCULATION LINE INTO THE EXTERNAL TANK, AND THE TANK STARTS TO VAPORIZE.

PAGE 8.

SCENE: VIDEO THE LEFT UPPER MID SECTION OF THE SHUTTLE EXHIBITED THE START OF VEHICLE BREAK-UP, NOT THE LOWER RIGHT AS WOULD BE EXPECTED.

SCENE: VIDEO THE AFT SECTION EXHIBITING FLAMES , THE FOLLOWING FRAMES CLEARLY EXHIBIT THE REAL NATURE OF THE LH2 FAILURE AS THE BLOWTORCH FLAME MOVES. MOVING UP TO THE RECIRCULATION EGRESS OF THE SHUTTLE, AND IS CONSTANT AT THAT POSITION DURING VEHICLE BREAK UP. NO FURTHER FLAME IS WITNESSED AT THE AFT END OF THE LEFT SRB.

MARY PLEASE COUNT FOR FIVE SECONDS BEFORE CONTINUING
THE YELLOW FLAME IS THE LIQUID OXYGEN BECOMING INVOLVED IN THE FLAMING MALFUNCTION.

NASA EXPLANATION AT TIME OF SHUTTLE VAPORIZATION.

NASA'S SCENARIO AND CHANGE OF CAMERA LOCATION DOES NOT GIVE INVESTIGATORS CRITICAL PYROTECHNIC INFORMATION FOR A PROPERLY EVALUATED CONCLUSION. HOWEVER, SCENES IN SEQUENCE PROVE VALUABLE FOR INVESTIGATIVE CONTINUANCE.

SCENE: VIDEO RUN NASA'S EXPLANATION.

THE CAMERA LOCATION CHANGE FROM SIDE VIEW TO RIGHT REAR CAMERA. BY CHANGE OF CAMERA ANGELS IMPORTANT VIDEO INFORMATION HAS BEEN DELETED FOR FURTHER CASUAL OR PROFESSIONAL INVESTIGATORS.

SCENE: VIDEO SUSPECTED LH2 EXITING THE RECIRCULATION LINE AT THE MID-SECTION OF THE SHUTTLE.

THE ARROW POINTS TO WHAT LOOKS LIKE LIQUID HYDROGEN EXITING THE SHUTTLE AT THE RECIRCULATION LINE, AND GOING TO FLAME AT THE AFT SECTION OF THE SRB. THE POINT OF FLAME IS EXACTLY WHERE THIS KIND OF FAILURE WOULD BE EXPECTED TO OCCUR.

PAGE 9.

SCENE: VIDEO ULLAGE PRESSURE GRAFT.

ULLAGE PRESSURE ASSISTS IN PUSHING LIQUID HYDROGEN TO THE TURBO PUMP FOR EXTREMELY HIGH RATES OF LIQUID FLOW. I RULED OUT ULLAGE PRESSURE BEING THE CAUSE OF THE EXTREME FLOW OF LIQUID HYDROGEN OVER STRESS, SINCE THE GRAFT EXHIBITS NORMAL PRESSURE CONDITIONS UNTIL T PLUS 66.48 SECONDS, AND AT THAT TIME THE PRESSURE EXHIBITS AN ASYNCHRONOUS PATTERN. THE ET'S TANKS AFT SECTION DID NOT BREACH BY HEAT FROM THE OBSERVED TORCHING FLAME, FOR IF THAT HAD OCCURRED THE FLOOD OF LH2 WOULD HAVE BEEN APPARENT. I SUSPECT THE CAUSE IS RELATED TO THE RECIRCULATION FAILURE. TO MY KNOWLEDGE NASA CONTROLLERS NEVER INFORMED THE SHUTTLE CREW OF THE ULLAGE PRESSURE ANOMALY.

SCENE: STILLS NASA'S SRB STUDY, INCLUDED SCENES OF HOLE AT AFT OF SRB.
WFH: THE SOLID ROCKET BOOSTER FAILURE: WHICH CAME FIRST, THE INTERNAL BLOW-BY OF THE O-RINGS, OR AN EXTERNAL HOLE CAUSED BY BURNING LH2? IF THE HOLE AT THE AFT FIELD JOINT WAS LARGE ENOUGH THE ESCAPING GASES WOULD HAVE CAUSED THE SRB TO FLY IN AN AWKWARD MANNER WHEN SEPARATED FROM THE ET, AND IF THE SRB HAD BEEN FLAMING FUEL FROM LIFT-OFF THE SRB WOULD HAVE BLOWN-UP WELL BEFORE 73 SECONDS. THERE IS A SECOND HOLE THAT IS KNOWN TO BE CAUSED BY EXTERNAL FLAME, SCORCHING APPEARS PARABOLA SHAPED FROM TOP DOWN. I SUSPECT THE FIELD JOINT FAILED BECAUSE OF LH2 BURN THROUGH AFTER T PLUS 59, FAILING THE O-RING AND CAUSING INTERNAL GASES TO DAMAGE THE SRB AT A LATER TIME.

TO RECAP HOW I CAME TO THE LIQUID FUEL FAILURE CONCLUSION:

SCENE: STILL STILL FRAME OF THE SSME COMPARTMENT. (SPACE SHUTTLE MAIN ENGINE.)

1. THE INLETS OF LH2 LIQUID FUEL LINES FROM THE ET,... THE LH2 TURBO PUMPS, ..., AND OVER PRESSURE RECIRCULATION LINE THAT EGRESSES AT ABOUT THE MID-SECTION OF THE SHUTTLE. THE LOX SYSTEM FROM TANK TO INLET.

PAGE 10.

SCENE: UNEXPLAINED ROLLING BALLS OF FLAME FROM NASA'S EXHIBIT.

SCENE: VIDEO SLOW MOTION OF LH2 FALLING INTO PLUMES TO VEHICLE BREAK-UP

I SUSPECT THE RECIRCULATION LINE FITTINGS ARE FAILED JUST AFTER LIFT-OFF, AND THE LH2 IS FALLING INTO THE PLUMES.

2. AT 58.7 SECONDS SMOKE APPEARS AT THE AFT PORTION OF THE RIGHT SRB. AT THIS TIME THE THROTTLE UP COMMAND IS BEING EXECUTED, THE LH2 PRESSURE IN THE RECIRCULATION LINE SURGES, AND THE SYSTEM FAILS AT MID-SHUTTLE EGRESS FITTINGS. THE ESCAPING LH2 STREAMS DOWNWARD, SPLASHES AROUND THE ET, AND FLAMES AT THE SRB FIELD JOINT.

3. AT 60.16 SECONDS TELEMETRY REGISTERED A DROP IN RIGHT BOOSTER CHAMBER. THE LH2 HAS NOW BURNED THROUGH THE SRB CAUSING THE SOLID FUEL TO FLAME, AND THE O-RING, IF NOT YET, WILL SOON BE DESTROYED AND THE SRB HOLE WIDENS.

4. AT 66.48 SECONDS THE LH2 ULLAGE PRESSURE FLUCTUATES. THE FAILED RECIRCULATION LINE CAUSES THE PRESSURE IN THE LH2 TANK TO DROP, AND IN RELATIONSHIP THE FLAME BETWEEN THE SRB AND EXTERNAL TANK HAS GROWN CONSIDERABLY.

5. AT 67.68 SECONDS TELEMETRY REGISTERED A DECREASE IN LOX INLET PRESSURE, SUGGESTING THE FUEL SYSTEM FROM INLET TO EXTERNAL TANKS IS BEING AFFECTED BY THE SPILLING LH2 FUEL.

6. 73.326 SECONDS THE VARIOUS FAILURES OVERTAKE ALL REDUNDANCY, AND THE LAUNCH VEHICLE VAPORIZES.

THE SRB WOULD BE EXPECTED TO TUMBLE OR VEER OFF COURSE WITH A LARGE HOLE AS WAS NASA'S EXPLANATION, BUT THAT DID NOT HAPPEN UNTIL MANY SECONDS AFTER SEPARATION. BOTH SRB'S WERE NEEDLESSLY DESTROYED BY RANGE SAFETY CONTROL AT ABOUT 109 SECONDS, IN SO DOING EVIDENCE WAS DAMAGED OR DESTROYED. IT WAS UNNECESSARY TO DESTROY THE SRBS AS THEY HAD ONLY ABOUT 10 SECONDS OF BURN TIME REMAINING.

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IF THE ROGERS COMMISSION HAD INVESTIGATED THE LIQUID HYDROGEN SCENARIO THEN TELEDYNE WOULD HAVE BEEN DISCOVERED FALSIFYING TEST RESULTS OF THE COMPUTER MODULES THAT CONTROLLED THE LIQUID FUEL SYSTEM.

A NASA TASK FORCE DID NOT CONFIRM THE ROGERS COMMISSION SRB SCENARIO! "CHALLENGER THE FINAL VOYAGE", BY RICHARD S. LEWIS, PAGE 52: "WHAT REMAINED TO BE DETERMINED WAS THE CAUSE OF THE LEAK. THAT BECAME THE FOCUS OF THE MOST INTENSIVE TECHNICAL INVESTIGATION OF THE SPACE AGE. AFTER 120 DAYS OF EXAMINATION, THE PRESIDENTIAL COMMISSION DETERMINED THAT THE LEAK RESULTED FROM THE FAILURE OF RUBBER O-RINGS TO SEAL THE JOINT BETWEEN THE AFT AND AFT-CENTER BOOSTER SEGMENTS. BUT THE PRECISE CAUSE OF THAT FAILURE COULD ONLY BE CONJECTURED".

QUICK CUT: SRBS IN VERTICAL FLIGHT AFTER VEHICLE BREAK-UP.

WFH: THESE SCENES EXHIBIT NO IRREGULAR FLIGHT OF EITHER SRB BY: NO TUMBLE, OR CIRCULAR ROTATION.

SCENE: VIDEO NASA SCENARIO OF THE SRB MOMENTS PRIOR TO VEHICLE BREAK-UP.

INVESTIGATORS DID ESTABLISH AWKWARD MOTIONS OF THE LEFT SRB THAT DID NOT CONTINUE AFTER VEHICLE BREAK-UP - WHY, DID NOT THE LEFT SRB FLY CRITICALLY OUT OF CONTROL - BECAUSE THE FAILURE TO THE FIELD JOINT WAS NOT LARGE ENOUGH YET, AND THE HOLE WAS NOT LARGE ENOUGH BECAUSE IT FAILED JUST AFTER T PLUS .59 SECONDS, NOT AT LIFT-OFF WHEN THE BLACK PUFFS OF SMOKE ARE EXHIBITED.

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SCENE: VIDEO FLIGHT PATH EXHIBITED BY NASA'S WIND SHEAR EXPLANATION.

SCENE: VIDEO

WHAT SAVED THE SHUTTLE FROM THE BLOW-TORCH LH2 FAILURE ON THE SRB AND ET. THE SHUTTLE FLEW AN IRREGULAR PATTERN. NASA IDENTIFIED THIS AS BEING CAUSED BY WIND SHEAR. THE ARGUMENTS AGAINST THE WIND SHEAR ARE:

1. IF WIND COULD CAUSE THE LAUNCH VEHICLE TO MOVE SIDEWAYS, THEN CERTAINLY THE TRAILING PLUMES WOULD CONTINUE TO DISPERSE AT A RAPID RATE. IT WAS THIS AWKWARD FLIGHT THAT SAVED THE SRB OR ET FROM BLOWING-UP IMMEDIATELY FROM THE BLOWTORCH LH2. THE TORCH WAS NOT AT ONE SPOT LONG ENOUGH TO MELT THE CASING AND IGNITE THE SRB'S FUEL.
2. THE WIND SHEAR SUDDENLY STOPPED AS THE SHUTTLE BROKE UP. THERE IS NO EXHIBIT OF WIND SHEAR IN EITHER THE ASCENDING SRB'S, OR THE DESCENDING OBJECTS TRAILING EXHAUST.
3. IN PRE-LAUNCH DISCUSSION BETWEEN SCOBEE AND SMITH THEY COMMENT:

SCOBEE: WINDS OUT OF THE NORTH BLOWING PRETTY STRONG, LOOKS LIKE.
SMITH: THEY ARE OR AREN'T?
SCOBEE: THEY'RE NOT. THE ANEMOMETER ISN'T GOING AROUND, AND THE ARROW'S POINTING IN THE RIGHT DIRECTION.

IF THE ROGERS COMMISSION HAD INVESTIGATED A GUIDANCE SYSTEM FAILURE, THEN TELEDYNE WOULD HAVE BEEN DISCOVERED IN FALSIFYING THE TEST RESULTS OF THE COMPUTER MODULES THAT CONTROLLED THE GUIDANCE SYSTEMS.

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SCENE: VIDEO

MOMENTS BEFORE THE CABIN ENTERS THE OCEAN, BIRDS ARE SEEN FLYING BY.

WFH: THE FOLLOWING SCENES ARE SUSPECTED TO BE THE CABIN DESCENDING TO THE OCEAN. IT TOOK MINUTES FOR THE FALLING PARTS TO SPLASH DOWN, AND SOME PARTS TOOK UPWARDS TO AN HOUR. THE CABIN WAS NOT LOCATED UNTIL APPROXIMATELY TWO MONTHS LATER.

IT IS WELL ESTABLISHED THAT THE ASTRONAUTS LIVED TO THE OCEAN ENTRY. WE KNOW THIS BY THE FACT THAT ALL EMERGENCY OXYGEN BOTTLES WERE TURNED ON, AND BY THE VOICES ON THE AUDIOTAPE RECORDER MCAULIFFE HAD SMUGGLED ABOARD, NOW SEALED BY COURT ORDER. THE AUDIOTAPE WAS NOT SUBJECT TO POWER LOSS AT TIME OF VEHICLE BREAK-UP. THIS AUDIO TAPE IS CONTROVERSIAL AND THERE HAVE BEEN ATTEMPTS TO ALLOW OTHERS THAN NASA TO REVIEW ITS CONTENTS. BY EXAMINATION IT WOULD ASSIST IN PROVIDING FACTS THAT INCLUDE THE ASTRONAUTS' MENTAL STATE DURING THE DESCENT, AND THE CAUSE OF THEIR DEATHS.

IN MID 1986 I WAS INFORMED BY LARRY MULLER THE NASA OFFICIAL WHO VISITED TELEDYNE THAT THE ASTRONAUTS EXHIBITED A PROFESSIONAL ATTITUDE WITHOUT PANIC DURING THEIR DESCENT. THE CREW DID NOT KNOW THE CABIN HAD SEPARATED FROM THE SHUTTLE, AND WERE WORKING TO RE-ESTABLISH ELECTRICAL POWER, WHICH WAS IMPOSSIBLE. THEY THEN STARTED SURVIVAL TECHNIQUES FOR ADVERSE OCEAN SPLASH DOWN.

THE INSTINCT TO LIVE IS THE STRONGEST INSTINCT OF ALL. AN OBJECT SUCH AS THE SHUTTLE CABIN CAN FREE DESCEND WITHOUT PARACHUTES TO THE OCEAN AND HAVE SURVIVORS. THE ENTRY WOULD BE ABOUT 200 MILES PER HOUR, THE ASTRONAUTS WERE WELL PROTECTED BY HELMETS, I WAS INFORMED BY ASTRONAUT GOODWIN THEIR FLIGHT SUITS WERE DESIGNED FOR SWIMMING, AND THEY WERE IN WELL CONSTRUCTED SEATS WITH SAFETY HARNESSES, THE CABIN GEAR WAS WELL STOWED AWAY.

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PETE ALDRIDGE INFORMED ME, THAT THE CABIN WAS DOUBLE HULLED. THE QUESTION I RAISED: THE HUMAN INSTINCT TO LIVE, WHY WERE THERE NO SURVIVORS?

AFTER ALL, RACE CAR DRIVERS HAVE SURVIVED, HEAD ON WRECKS WITH CONCRETE WALLS, AT SPEEDS OF MORE THAN 160 MPH, AND WALKED AWAY WITHOUT ASSISTANCE. PERHAPS MCAULIFFE'S AUDIOTAPE ANSWERS THESE IMPORTANT QUESTIONS.

SCENE: STILL FACE COVER OF MALCOLM MCCONELL BOOK.

IN MALCOLM MCCONNELL'S BOOK "CHALLENGER A MAJOR MALFUNCTION, PAGE 234 ", BUT THIS DITCHING MODE WAS NOT PART OF THE PREPROGRAMMED ABORT CAPABILITY". IF THAT IS TRUE, I FIND IT IRREGULAR AND WITHOUT LOGIC, SINCE IN THE EVENT OF FAILURE, DITCHING IN THE OCEAN IS HIGHLY PROBABLE. NASA'S VIEW OF DITCHING IS THAT THERE IS A LOW POSSIBILITY FOR CREW SURVIVAL. HOWEVER, TO HAVE REMOVED THE DITCHING PROGRAM WOULD BE TRULY STUPID. THE CABIN CREW DIALOGUE JUST AFTER THE ROLL SEQUENCE IMPLIES THE ASTRONAUTS KNEW SOMETHING WAS VERY SERIOUSLY WRONG WITH THEIR LAUNCH VEHICLE, DITCHING AT THIS TIME IS PROBABLE.

SCENE: STILL FLIGHT DECK OF THE SHUTTLE.

T PLUS 0:07. SCOBEE: HOUSTON, CHALLENGER ROLL PROGRAM. (THE FIRST MANEUVER AFTER LIFT OFF WAS TO ROTATE THE SHUTTLE TO ASCENT ATTITUDE, IN WHICH THE ORBITER WAS TURNED TO FACE THE EARTH.)

T PLUS 0:11. SMITH: GO YOU MOTHER. (TO ME, THIS KIND OF LANGUAGE SIGNALS STRESS.)

T PLUS 0:14. RESNIK: LVLH. (RESNIK ALSO BECOMES CONCERNED, THE LAUNCH VEHICLE IS NOT REACTING TO EXPECTED FLIGHT.)

T PLUS 0:15. RESNIK: SHIT HOT! (HOT SHIT MEANS ONE THING, BUT SHIT HOT MEANS TROUBLE.)

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T PLUS 0:16. SCOBEE: OOOH KAAY. (WOULD HE BE NOW LOADING THE ABORT PROGRAM, AND FINDING IT NOT ON THE PREPROGRAMMED FILES?)

T PLUS 0:19. SMITH: LOOKS LIKE WE'VE GOT A LOT OF WIND UP HERE TODAY.

T PLUS 0:20. SCOBEE: YEAH.

T PLUS 0:22. SCOBEE: IT'S A LITTLE HARD TO SEE OUT MY WINDOW HERE.

NASA PRIDES ITSELF ON PROPER RADIO LANGUAGE. THIS KIND OF COMMUNICATION TRAFFIC IS ALARMING, SINCE NASA ASTRONAUTS ALWAYS USE CORRECT WORDS AT ALL TIMES.

MR. ALDRIDGE CONCLUSION AFTER INTERVIEWING ME WAS THAT MY INVESTIGATION WAS UNIQUE, ANSWERED QUESTIONS, AND SHOWED NASA TO BE NEGLIGENT. AFTER THE STUDY OF THE SRB FAILURE HE RETORTED "WHAT WAS ROGERS THINKING"! EVEN THOUGH THE AIAA CONCLUDED MY STUDY WAS CORRECT CONCERNING THE CAUSE OF THE CHALLENGER DISASTER I CAN NOT ASSIGN BLAME TO ANY MANUFACTURER. THE STUDY ONLY SUGGEST TELEDYNE IS SUSPECT AT THIS TIME.

NUCLEAR PROPULSION ROCKETS AND NUCLEAR POWER SOURCES.

SCENE: SLOW MOTION SHUTTLE LIFT-OFF

IN 1989 I JOINED THE CHRISTIC INSTITUTE'S LITIGATION TO HALT THE NASA SPACE SHUTTLE ATLANTIS. ON BOARD WAS THE SPACE-PROBE GALILEO WHICH WAS FUELED BY FIFTY POUNDS OF PLUTONIUM. THE THREAT WITH NUCLEAR FUELS IS THAT THEY CAN YIELD IN FIERY MALFUNCTIONS, OR THE NUCLEAR FUEL CAN VAPORIZE AND BLOW AWAY, SUCH AS IN A LAUNCH PAD DEVASTATION, OR THE LAUNCH VEHICLE FAILS AND CRASHES BACK ON EARTH. GALILEO CARRIED A NUCLEAR FUELED DEVICE KNOWN AS A RADIOISOTOPE THERMALELECTRIC GENERATOR (RTG).

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THE DESIGN WAS PURCHASED FROM RUSSIA, AND WIDELY USED BY RUSSIA AND THE UNITED STATES. TWO RUSSIAN RTG'S HAVE ALREADY CRASHED BACK ON EARTH CONTAMINATING LARGE PORTIONS OF CANADA AND ELSEWHERE.

SCENE: VIDEO LAUNCH VEHICLE LIFTING OFF, QUICK CUT TO NUCLEAR EVENT

OUR NATION WAS OBLIGATED NOT TO LAUNCH GALILEO. THE CHRISTIC INSTITUTE'S LITIGATION FAILED. EVEN THOUGH MY TESTIMONIAL INCLUDED THAT TELEDYNE HAD FALSIFIED TESTS ON PREVIOUS OCCASIONS, AT THIS TIME THERE WERE ONGOING LAUNCH SEQUENCE HALTS BECAUSE THESE VERY COMPUTERS FAILED MOMENTS PRIOR TO LIFT-OFF. ONLY SUCCEED IN HALTING THE LAUNCH FOR A FEW DAYS. I WAS CONCERNED THAT FAILED MODULES WERE STILL BEING DELIVERED TO NASA BECAUSE OF THE CONTINUOUS LAUNCH HALTS INVOLVING THESE ELECTRONICS. THE CONTINUANCE OF THIS LAUNCH CARGOING NUCLEAR FUELS GIVES THE IMPRESSION THAT OUR JUDICIARY IS WILLING TO PLACE OUR EARTH IN JEOPARDY FOR SIMPLE SPACE EXPLORATION. UNKNOWN TO ME AT THE TIME OF THE GALILEO LITIGATION THE DEPARTMENT OF JUSTICE AND THE PENTAGON HAD RECEIVED PLEAS OF GUILT, AND COURT ROOM CONVICTION OF TELEDYNE EXECUTIVES CONCERNING PROCUREMENT FRAUD AND OTHER MATTERS.

SCENE: STILL THE DELTA CLIPPER CHEMICAL PROPULSION, AND RUSSIAN MODEL USING NUCLEAR PROPULSION.

CURRENTLY WE HAVE A NEW MODE OF STATE OF THE ART ROCKETRY, KNOWN AS SPACE NUCLEAR POWER, OR THERMIONICS. THE UNITED STATES HAD SPENT MILLIONS ON NUCLEAR PROPULSION, BUT IT WAS THE RUSSIANS WHO DEVELOPED A NUCLEAR PROPULSION ENGINE, NAMING IT TOPAZ 2. WE IN TURN BOUGHT THEIR WORKING MODELS AND SINCE 1991 HAVE EMPLOYED THEM IN ROCKETS FOR UP-COMING MANNED SPACE EXPLORATION, AND THE BALLISTIC MISSILE DEFENSE PROGRAM.

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NUCLEAR ROCKETS ARE BY FAR FASTER THAN THE CHEMICAL ROCKETS WE ARE USED TO SEEING IN THE EVENING NEWS. NUCLEAR PROPULSION ROCKETS CAN TRAVEL TO MARS IN LESS THAN HALF THE TIME IT TAKES THE OLDER CONVENTIONAL ROCKETS. THE CHRISTIAN SCIENCE MONITOR AND OTHER WELL ESTABLISHED ORGANIZATIONS HAVE CALLED FOR A WORLD-WIDE BAN ON NUCLEAR POWER SOURCES SUCH AS NUCLEAR PROPULSION AS A METHOD OF SPACE TRAVEL. I STRONGLY SUPPORT AN IMMEDIATE INTERNATIONAL BAN ON THESE SYSTEMS. CURRENTLY THE GOVERNMENTS OF AMERICA, RUSSIA, AND JAPAN ARE EMPLOYING NUCLEAR POWERED ROCKETS IN THEIR INVENTORIES.

THE TOPAZ DESIGN MAYBE A HOPE FOR OUR NUCLEAR WASTE PROBLEM IN REGARDS TO NUCLEAR POWER PLANTS, BUT NOT ON AN UN-STABLE LAUNCH VEHICLE.

RUSSIAN DESIGN OF THE DELTA CLIPPER.

THE DELTA CLIPPER IS A SINGLE STAGE ROCKET HAS BEEN TESTED AND PROVED SUCCESSFUL FOR VERTICAL AND HORIZONAL FLIGHT. (VTOL) OR VERTICAL TAKE OFF AND LANDING. THE INTENT IS TO LAUNCH, CLIMB TO ORBITAL PLACEMENT, RELEASE OR RETRIEVE SPACE OBJECTS, AND THEN RETURN TO EARTH AND LAND. THE RUSSIAN VERSION OF THE DELTA CLIPPER IS DESIGNED WITH NUCLEAR PROPULSION. OTHER MEANS OF EMPLOYING NUCLEAR PROPULSION ROCKETS ARE ON TOP OF (TOR) TRANSFER ORBITAL ROCKETS SUCH AS THE SATURN AND TITAN LAUNCH VEHICLES.

IT WAS THE BUSH ADMINISTRATION WHO TRIED TO KEEP NUCLEAR PROPULSION INFORMATION FROM THE PUBLIC.

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SCENE: TITLE SPACEPORT PROPOSAL PALIMA POINT, HAWAII.

SCENE: STILL MAP OF THE HAWAIIAN ISLANDS.

CURRENTLY IN HAWAII THERE IS AN OPEN COMMERCIAL SPACEPORT PROPOSAL. PENDING THE STATE'S ENVIRONMENTAL IMPACT STATEMENT IS UNDER REVIEW BY THE PUBLIC. THERE WILL BE NO POPULAR VOTE ON THE SPACEPORT ISSUE. IN REGARD TO THE STATE'S DEIS, IT CAN ONLY BE CONTESTED IN WRITING TO: THE OFFICE OF ENVIRONMENTAL QUALITY CONTROL FOR THE STATE OF HAWAII. THE STATE OF HAWAII WANTS TO BE COME A LANDLORD OF THE FACILITY, WITHOUT FURTHER LEGAL OBLIGATIONS.

THERE ARE NO LAUNCH RESTRAINTS OR CONSTRAINTS PROTECTING THE PUBLIC WRITTEN INTO THE STATE DRAFTED EIS. WE ARE ASKED TO TRUST THE FACILITY OPERATORS AND CONSORTIUM FOR THEIR LAUNCH JUDGEMENTS. FURTHER, THERE IS NO CONSORTIUM OR OPERATORS' CONTRACT PREPARED FOR THE PUBLIC TO REVIEW, ONLY A LETTER OF INTENT BETWEEN HAWAII AND LOCKHEED, WHICH MY REQUEST TO REVIEW HAS TO DATE BEEN DENIED. TO UP-GRADE THE INFRASTRUCTURE SUPPORTING THE SPACEPORT CONCEPTION IS COSTLY TO THE STATE'S TAX PAYER. FOR INSTANCE, THE COST TO UP-GRADE THE ONLY 2 LANE ISLAND HIGHWAY WOULD BE EXTREMELY EXPENSIVE.

THE UNITED NATIONS HAS WORKED FOR YEARS TOWARDS LEGAL REMEDIES IN THE EVENT OF DISASTER CAUSED BY LAUNCH VEHICLES OR SPACE OBJECTS THAT DAMAGE ANOTHER COUNTRY. THE DRAFTED PRINCIPLE ON LIABILITY AND COMPENSATION STATES THAT EACH COUNTRY WHICH LAUNCHED OR PROCURED THE LAUNCHING OF A SPACE OBJECT, AND EACH STATE FROM WHOSE TERRITORY OR FACILITY A SPACE OBJECT WAS LAUNCHED, WOULD BE INTERNATIONALLY LIABLE FOR DAMAGES CAUSED BY SUCH SPACE OBJECTS OR THEIR COMPONENT PARTS.

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SCENE: TITLE AREAS OF CONCERN:

1. SPACE NUCLEAR POWER SOURCES, SUCH AS RTG'S AND NUCLEAR PROPULSION ARE CONSIDERED "STATE OF THE ART" TECHNOLOGY! EVEN THOUGH PLANNED FOR DEPLOYMENT, NUCLEAR PROPULSION IS STILL ABSTRACT IN THEORY AND ON THE EDGE OF TECHNOLOGY IN A POORLY REGULATED INDUSTRY. HAWAII LAW, ACT 172 PROHIBITS NUCLEAR FUELED LAUNCH VEHICLES. HOWEVER HAWAII LAW DOES NOT APPLY WITH THE FEDERAL GOVERNMENT WHICH SAYS "NUCLEAR AND HAZARDOUS WASTES MATERIAL COULD BE LAUNCHED DESPITE STATE LAW".

HAZARDOUS WASTES COULD VERY WELL MEAN THE ROCKET'S EXHAUST PLUME IS RADIOACTIVE. A TEST OF NUCLEAR PROPULSION WAS CANCELED THIS YEAR BECAUSE ASTRONOMERS ARGUED THAT OBSERVATION WOULD BE DAMAGED FOR YEARS TO COME.

** MARY GIVE ME 1 SECOND BETWEEN NUMBERS.

SCENE: MAP OF LAUNCH FACILITY, PAHALA, TANK FARM, LAUNCH PADS, HAZARD ZONES.

2. THE TOWN OF PAHALA IS A MERE 2.9 MILES FROM THE PROPOSED SPACEPORT.
3. THE SPACEPORT IS TO BE DEVELOPED AT THE BASE OF TWO ACTIVE VOLCANOS.
4. THE NORTH SIDE OF THE KILAUEA VOLCANO HAS AN ON-GOING ERUPTION CYCLE LASTING FOR MORE THAN TEN YEARS. ON THE SOUTH SIDE THE LAUNCH PADS WOULD BE NESTED IN THE PATH OF A FAULT KNOWN AS THE GREAT CRACK.
5. THE GREATER ACTIVE VOLCANO MAUNA LOA RESTS JUST A FEW MILES FROM THE LAUNCH SITE. ITS LAST ERUPTION WAS IN THE EARLY 1980'S, AND AT THAT TIME THE LAVA FLOW THREATENED THE TOWN OF HILO. THE RIM IS SET TO FLOW LAVA IN THE DIRECTION OF THE LAUNCH FACILITY.
6. THE SITE OF THE FUEL TANK FARM IS ON TOP OF A FLOOD GULCH, AND IN A FLOOD ZONE. IN THE EVENT OF A TANK FARM DEVASTATION THE TOWN OF PAHALA WOULD BE SUBJECTED TO CONSIDERABLE IF NOT TOTAL DISASTER.

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7. ALL FUELS WOULD BE TRANSPORTED FROM THE HARBOR AT HILO. THERE WOULD BE A HAZMAT TEAM, WHOM IT IS SAID CAN CONTAIN ANY DISASTER WITHIN MINUTES, THAT IS IF THEY ARE NOT CAUGHT-UP IN THE EVENT. THE HIGHWAY, WHICH IS NOT MORE THAN A TWO LANE ROAD FROM HILO TO THE PROPOSED LAUNCH FACILITY, WOULD BE SUBJECT TO CLOSURE FOR LONG PERIODS OF TIME IF AN ACCIDENT DID OCCUR. ALL TRAFFIC, EVEN INCLUDING EMERGENCY VEHICLES WOULD HAVE TO BE ROUTED FROM OTHER LOCATIONS ON THE ISLAND. HELICOPTERS COULD CAUSE MORE OF A SPREAD OF CONTAMINATION AND THEREFORE USELESS IN EVACUATION. TERRORIST ACTIVITY SHOULD NOT BE RULED OUT.

SCENE: STILL TURTLE AND DIVER

8. ALL WILD LIFE IN THE VICINITY OF THE LAUNCH FACILITY, INCLUDING A NUMBER OF ENDANGERED SPECIES, WOULD BE SUBJECT TO CHEMICALS, NOISE, AND FLOOD-LIGHT POLLUTION. EVEN FAMILY PETS CAN BE A LIFE THREAT IF THEY HAVE ACCUMULATED FUELS ON THEIR FUR. PET YOUR ANIMAL AND BECOME SUBJECT TO LIFE THREATENING POISONS. SOME FUELS CAN PENETRATE HUMAN SKIN.

9. LAND VALUES WOULD START A NEGATIVE SPIRAL WHEN THE LAUNCH FACILITY IS LICENSED. FURTHER, TOURISM WOULD DECLINE WHEN AND IF NUCLEAR PROPULSION ROCKETS ARE LAUNCHED, OR A NUCLEAR INVOLVED DISASTER OCCURS. IMMEDIATE EVACUATION OF THE ISLAND IS OUT OF THE QUESTION.

SCENE: WIND PATTERN MAP WIND PATTERN OF THE ISLAND OF HAWAII.

10. WIND WILL BE A CARRIER OF ANY AND MOST OF THE CHEMICALS, OR NUCLEAR MATERIAL AROUND THE ISLAND OF HAWAII. IN THE EVENT OF A NUCLEAR YIELD THE ENTIRE ISLAND CHAIN IS AT RISK.

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11. THE OFFICE OF SPACE INDUSTRY CLAIMS THERE WILL BE 15 TO 22 LAUNCHES A YEAR. HOWEVER, OSI IS CONSTANTLY LOOKING FOR MORE BUSINESS, AND MILITARY AND SCIENCE PROJECTS CAN NOT BE EXCLUDED. AFTER THE YEAR 2000 TRAFFIC FOR PLANETARY EXPLORATION BY NUMEROUS NATIONS IS EXPECTED TO RISE CONSIDERABLY. THE CONCEPTUAL PLAN IS FOR ROCKETS UP TO DELTA AND ATLAS CLASS, BUT THAT CAN CHANGE AFTER THE PUBLIC REVIEW PERIOD. THE USE OF SINGLE STAGE ROCKETS, EITHER CHEMICAL OR NUCLEAR PROPULSION, WILL CERTAINLY BE INCORPORATED. THE DELTA CLIPPER WILL DOUBLE THE STRESS ON THE ECOLOGICAL SYSTEMS OF THE ISLAND. I'M CERTAIN IN CONCEPT THERE WILL BE A LOT OF UN-WANTED BUSINESS FOR A SPACEPORT, CAPABLE OF LAUNCHING ROCKETS WHOSE PAY-LOADS ARE FOR: PLANETARY EXPLORATION, EQUATORIAL, POLAR, AND GEOSYNCHRONOUS ORBITS.

THE AEROSPACE INDUSTRY PREFERS FAILED ROCKETS END IN THE OCEAN, OUT OF THE PUBLIC'S SIGHT.

SCENE: STILL BRUCE AMES RESEARCH.

CANCER FROM GENETIC TOXICITY HAS BEEN STUDIED BY BRUCE AMES. CHEMICAL FUELS ARE NOT ENTIRELY CONSUMED IN THE LAUNCH SEQUENCE, AND THERE IS ALWAYS THE CHANCE OF CHEMICAL SPILLAGE. NUCLEAR MATERIAL VAPORIZES, BECOMES AIRBORNE TO POLLUTE THE ATMOSPHERE BURNING HAS NO DIMINISHING EFFECT ON THE ATOM, IT'S STILL ACTIVE AND LETHAL FOR TENS OF THOUSANDS OF YEARS. HERE ARE JUST A FEW OF MR. AMES RESEARCH:

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SCENE: STILLS OF BRUCE AMES' FINDINGS.

"SO FAR MOST ATTENTION HAS BEEN FOCUSED ON "ENVIRONMENTAL" CAUSES OF CANCER-CHEMICAL CARCINOGENS. HERE WE WILL ESPECIALLY BE LOOKING AT MUTAGENICITY - THE CAUSING OF MUTATIONS IN HUMAN GENES, PRIMARILY EXPRESSED AS AN INCREASE IN MISCARRIAGES AND BIRTH DEFECTS, BUT PERHAPS IN OTHER WAYS AS WELL. IN THIS REGARD THE SCIENCE OF HUMAN GENETICS, OF ENORMOUS CONSEQUENCE, IS SHOCKINGLY IMPRECISE. IT'S SLOW, DEEP POISON. AND THERE'S NO ANTIDOTE, NO CURE. ONLY PREVENTION" BRUCE AMES.

THE CONCLUSION I HAVE COME TO: THE AMERICAN SPACE INDUSTRY HAS SLIPPED INTO THE DARKEST PERIOD OF ITS HISTORY. PROCUREMENT FRAUD AND INTENTIONAL FALSIFYING OF SIMULATOR TESTS FOR FLIGHT COMPUTERS, ON THE MANNED AND UNMANNED LAUNCH VEHICLES, THOSE RESPONSIBLE NAVE BEEN PROTECTED BY GOVERNMENT AND JUDICIAL AUTHORITIES EVEN AFTER THE DEATHS OF SEVEN POPULAR ASTRONAUTS.

SCENE: STILL LAUNCH VEHICLE ON PAD

THE SPACE RACE INDUSTRY, FUELED BY THE MILLENNIAL OLD QUESTION; WHY IT IS THAT WE AND THE UNIVERSE EXIST, HAS TRIGGERED THE RELENTLESS DESIRE FOR HUMANS TO ANSWER THIS MYSTERIOUS QUESTION IN THE FEW SHORT YEARS THAT NASA HAS EXISTED. IN SO DOING WE HAVE DAMAGED OUR ENVIRONMENT, AND CAUSED MANY TO SUFFER, SOME IN HIDEOUS MOMENTS OR FOR YEARS IN PHYSICAL AND MENTAL AGONY. MEANWHILE THOSE IN POWER HAVE LOOKED THE OTHER WAY (IGNORING THE FACTS) SO THEY CAN TAKE PART IN ANSWERING THE QUESTION AS TO WHY WE EXIST.

NOT ONLY ARE THERE SEVEN DEAD ASTRONAUTS, BUT HUNDREDS OF AMERICAN MILITARY SERVICE PERSONNEL. WHO DIED IN A SINGLE ATTACK BY AN ENEMY SCUD MISSILE DURING THE PERSIAN GULF WAR. A TELEDYNE GUIDANCE PACKAGE WAS USED FOR THE DEFENDING PATRIOT MISSILE.

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TO DATE TELEDYNE HAS PLEADED GUILTY FOR FALSE TESTING ON THE FOLLOWING LAUNCH VEHICLES: NASA'S SPACE SHUTTLE, PATRIOT, AND STINGER. OUR AEROSPACE INDUSTRY IS OUT OF CONTROL, EXHIBITING LITTLE OR NO REGARD FOR PUBLIC SAFETY OR THE ENVIRONMENT.

CURRENTLY THERE ARE NO LAWS IN THE SPACE RACE INDUSTRY. SOCIETY ITSELF CAN NO LONGER TOLERATE THE ABUSES AND RISKS. THE AEROSPACE INDUSTRY HAS PROVEN THAT IT CAN NOT BE TRUSTED. THE TRUTH AND ANSWERS TO THESE CRITICALLY IMPORTANT QUESTIONS MUST BE OFFICIALLY AND FORMALLY DEALT WITH. FOR WE MUST FIRST BE ABLE TO DEAL WITH THE CHALLENGES OF THE PRESENT BEFORE WE CAN, IN CLEAR CONSCIENCE, COMMIT OUR NATION TO A RACE FOR SPACE IN THE FUTURE.

I HAVE TRUST IN AMERICAN POLITICS, SCIENCE AND TECHNOLOGY, AND SOCIETY'S COMPASSION WHEN PRESENTED WITH CLEAR SOUND INFORMATION. I HAVE SERVED IN VIETNAM AS A UNITED STATES MARINE, SEMPER FI IS OUR MOTTO, AND WE NEVER LOWER OUR NATIONS FLAG. THIS HAS EXEMPLIFIED THE TRUE SPIRIT OF THE MARINES IN MANY BATTLES. IN SCIENCE I HAVE, ON MY OWN, RESEARCHED THE PROBLEMS, ANSWERED THE COMPLEX QUESTIONS, AND DEVELOPED A WORKING MODEL THAT SOLVED THE ABILITY OF A COMPUTER TO PRINT ALL THE WORLDS LANGUAGES THAT WERE CONSIDERED UN-PRINTABLE BY COMPUTER. I WILL NOT REST UNTIL I AM ASSURED THAT SPACE NUCLEAR POWER SOURCES HAVE BEEN BANNED WORLD-WIDE, AND THE ONGOING ETHICAL DILEMMA IN THE AEROSPACE COMMUNITY HAS BEEN RESOLVED.

PRESIDENT CLINTON HAS PROVED HIS SINCERITY CONCERNING ENVIRONMENT ISSUES BY CANCELING SPACE NUCLEAR PROPULSION LAUNCHES, AND INTERNATIONALLY BAN ON NUCLEAR BOMB TESTING. I HAVE THE GREATEST ADMIRATION FOR THE CLINTON ADMINISTRATION.

THE END

FADE OUT:

PAGE 24.

RUN CREDITS:

SPECIAL THANKS TO:

PRESIDENT CLINTON AND HIS ADMINISTRATION

WILLIAM MCINNIS, NASA ENGINEER, POSTHUMOUS

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

LANNY SINKIN, ATTORNEY

SENATOR DANIEL AKAKA, HAWAII

JAMES FLETCHER, NASA ADMINISTRATOR, POSTHUMOUS

CHRISTIC INSTITUTE

AND ALL THOSE WHO SIGNED, OR WOULD HAVE SIGNED, PETITIONS TO:

BAN SPACE NUCLEAR POWER SOURCES

I AM EXTREMELY GRATEFUL TO THOSE IN THE NEWS MEDIA WHO HAVE PROVIDED TIME TO ME IN MY EFFORTS, AND TO THOSE WHO SEEK THE TRUTH AND ANSWERS TO THE EXTREMELY CRITICAL QUESTIONS POSED HEREIN.

PRODUCED, WRITTEN, AND DIRECTED BY: WILLIAM F. HACHMEISTER

NARRATION BY M. KRIJGSMAN:

CARTER....._____

HACHMEISTER...._____

ONIZUKA....._____

RESNIK....._____

SCOBEE....._____

SMITH....._____

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MATERIAL FOR THIS PRODUCTION:

NASA, BRIEFLY BLUE PRINTS

RICHARD S. LEWIS, CHALLENGER THE FINAL VOYAGE

MALCOLM MCCONNELL, CHALLENGER A MAJOR DISASTER

STATE OF HAWAII DRAFT ENVIRONMENTAL IMPACT STATEMENT

BRUCE AMES RESEARCH, WHOLE EARTH CATALOG, NO. 21 SPRING 1979

HAWAII TRIBUNE HERALD

AVIATION WEEK & SPACE TECHNOLOGY

CHRISTIAN SCIENCE MONITOR

WALL STREET JOURNAL

WASHINGTON POST

UN CHRONICLE

MARINE SANCTUARY SPRING/SUMMER 1993, TURTLE AND DIVER PICTURE

VIDEO: CANADA PRODUCTION, THE CHALLENGER DISASTER AND INVESTIGATION

VIDEO: ACKERMAN AND BLACK PRODUCTION, VOLCANO FOOTAGE

VIDEO: CNN DESERT STORM THE VICTORY, SCUD AND PATRIOT MISSILES

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VIDEO RENTAL: PARADISE RENT TO OWN

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SCENE: SINCERELY,

WILLIAM FREDERICK HACHMEISTER

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