



A Proposal to Relocate Broadcast Facilities on Haleakalā

High up near the summit of Haleakalā, a conflict has been brewing for years. At the center of this conflict are researchers who use sensitive electronic equipment in their work at Haleakalā Observatories,

and broadcasters, whose radio and television communication facilities produce high-powered signals. The signals from the broadcast facilities can interfere with the electronic equipment at

the observatories. Imagine sitting down at a computer screen expecting to review data from your most recent solar observations and instead seeing a blurry image of the local weather report!

The “observatories” (buildings equipped for observing natural phenomena, as in astronomy) and broadcast facilities have grown up side-by-side near the summit. The summit offers atmospheric and space researchers an accessible high-elevation vantage point for their research. The summit provides radio and television broadcasters coverage of Maui, the windward side of O‘ahu, and the Kona coast of Hawai‘i.

From the summit of Haleakalā, there are also clear microwave paths to receive transmissions from studios on O‘ahu that can in turn be transmitted to other areas.

There are not too many options for resolving this situation. Commercial broadcasters now occupy six sites on Haleakalā, most of which are next to or even within the 18-acre Haleakalā High

Altitude Observatory site. New technological developments mean that researchers at the observatories are using electronic equipment that is increasingly sensitive to radio frequency interference (RFI) from the transmitters. There have been some efforts to shield the research equipment, but shielding is expensive and only partially effective.

The situation is bound to get worse, not better, if the broadcast facilities are left where they are. Applications



*LURE observatory
(Photo: Michael Maberry)*



*Transmitter facilities in the saddle area
(Photo: Michael Maberry)*

for construction permits for several new stations have been submitted, and some have been approved. In addition, the federal government has



*Air Force AEOS telescope
(Photo: U.S. Air Force)*

mandated a transition to digital television. During this transition period, broadcasters will be constructing new digital transmitters to accompany the existing analog facilities. After a number of years, the analog transmitters will be phased out. In the meantime, however, there will be more transmitters and more RFI for the observatories.

A Proposed Solution

In 1998, the University of Hawai‘i Institute for Astronomy formally proposed moving all of the broadcast facilities in the summit area to a single site about a mile away from Haleakalā Observatories. Its aim was to reduce the proliferation of transmitter facilities at the summit and to protect the observatories from radio frequency interference. The Institute commissioned a site selection study and prepared an “environmental

assessment” (this term is defined in the sidebar on the environmental review process).

Four alternative sites were examined to see:

- 1) Whether they would reduce RFI to an acceptable level at the observatories, and
- 2) If they would provide adequate coverage for broadcast facilities.

Based on that analysis, a site along the southwest rift zone near Kalepeamo Pu‘u was chosen as the best option. Therefore, the likely impacts of developing a coordinated broadcast facility at the Kalepeamo site were studied. The results of that analysis were published in the Draft Environmental Assessment.

The Kalepeamo Site Plan

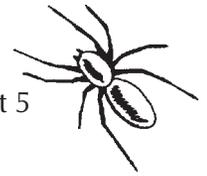
The proposed facility would be built on land owned by the state of Hawai‘i and managed as conservation land. It would be at an elevation of 2900 meters (9250 feet) on the southwest rift zone of Haleakalā. Access to the site is along Skyline Drive, an unimproved, gated road that is sometimes used as a trail by hikers, hunters, and mountain bikers.



Antennae with Pu‘u‘ula‘ula (Red Hill) in the background (Photo: Michael Maberry)

A utility corridor already exists along Skyline Drive, making it easy to extend electricity and telephone service to the site. A diesel generator would provide backup

power, requiring an above-ground fuel storage tank. Non-potable water would be collected from a roof catchment system. Maintenance workers at the facilities would carry in their own drinking water. A septic system would be installed for sewage disposal.



The proposed coordinated broadcast facility would include as many as four antenna towers, each of which would be no taller than 61 meters (199 feet). Transmitters and other equipment would be housed in individual shelters or in a single building with separate rooms. Other rooms (or separate buildings) would house the power distribution center, the standby generator, and toilet facilities.

The broadcast facility would be operated by remote control from Honolulu. Normally, the only people coming to the facility would be performing routine maintenance two to four times a month for each station. Fuel tanks for the generator would need to be topped off between one and four times per year.

Potential Impacts Considered In the Environmental Assessment

The environmental assessment explored a number of possible impacts of the construction and operation of the proposed facility. They included:

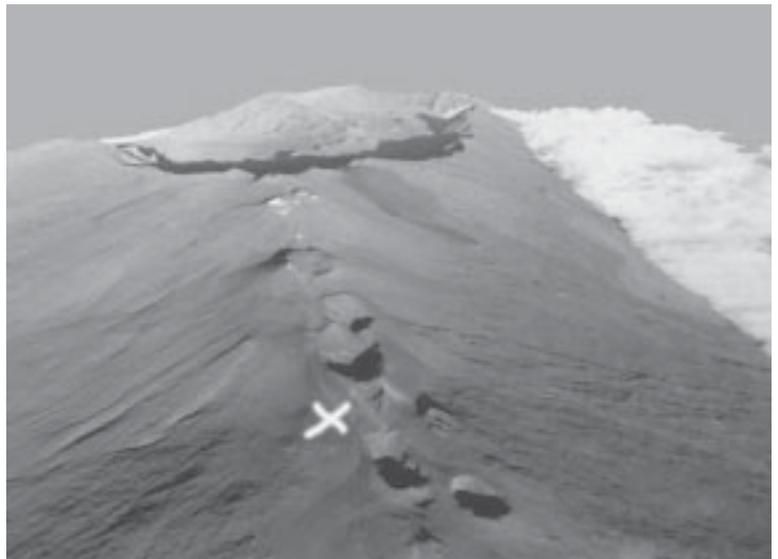
Air Quality, Traffic, Noise

Construction activities would generate dust, especially along the unpaved access road, and intermittent high noise levels. During construction, a small increase in traffic on the road to the summit would be expected. A small number of large, oversize loads would be timed during off-peak traffic hours in the park.

Once the facility became operational, there would be an estimated five to ten vehicle trips per week for maintenance and deliveries. This would cause no increase in traffic on the main Haleakalā road, since most of the tenants in the new facility would be broadcasters that already have facilities in the summit area.

Vegetation

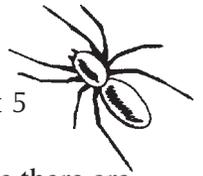
The site is sparsely vegetated with no threatened, endangered, rare, or vulnerable plants found there or in the surrounding areas. The biggest concern is the unwitting introduction of nonnative plants on construction equipment or supplies. To address this concern, the project plan proposed all incoming equipment, supplies, and construction materials be inspected by a park biologist.



The proposed site is marked on this photo. Observatories and existing transmitter sites are uphill from this site, along the rift zone. (Photo: Frank Rozzo)

Birds

The endangered 'ua'u or Hawaiian dark-rumped petrel fly over the proposed site during breeding season, especially at night. 'Ua'u are prone to colliding with objects such as power lines, utility poles, and barbed wire fences. To minimize impacts on the 'ua'u, the fencing around the facility would be designed based on advice from the U.S. Fish and Wildlife Service. In addition, utility cables would be buried wherever possible. During construction, work would be done during the daytime to avoid disturbing the birds with



lights at night. Nearby ‘ua‘u nests would be monitored to assure that vibrations from the construction do not disturb the birds or their burrows.

Invertebrates

A cursory site survey turned up no insect species unique to the area. Construction would disturb and destroy some insect habitat, but the larger concern is the potential to introduce non-native insects on equipment, supplies, and construction materials. Proposed inspections by a qualified biologist would guard against introducing alien species.

Archaeological Sites

Five sites had been recorded in a 1995 survey of the area. The State Historic Preservation Division found that neither of the two sites directly affected by project construction were prehistoric or otherwise especially significant. Also, the proposed project would not impede worship or access to previously accessible sites for Native Hawaiians. There could be temporary closures during construction.

Visibility

Construction equipment would be visible only in the immediate vicinity of the project. The broadcast facility itself would stand out among the rugged and barren cinder cones and craters. Few people would see the project up close, and those that do are likely to have many different opinions about it. The antennae would be visible from much of Upcountry Maui but not from most of the main visitor areas in the park.

Infrastructure, Utilities, & Services

Maui Electric Company would extend existing power lines to the site. Power use would not affect other electric company customers. A catchment system would provide the small amount of water used at the facility. The septic system for treating waste water would have no

adverse effect on ground water because there are no springs nearby and the ground water is thousands of feet below the surface. All other waste would be taken off-site for disposal.

Radio Frequency Interference

The facility and the observatories would be one mile apart, with shielding provided by the hilly terrain. This should make it easy for broadcasters to adjust the shape of their antenna beam to minimize RFI at Haleakalā Observatories.

Human Health and Safety

Analyses of the risk of human exposure to radio frequency radiation found levels to be well below the maximum limits.

What Happened to the Proposal

After the environmental assessment was written, the University of Hawai‘i released it for public comment. Based on their analysis, University staff and consultants believed that a “finding of no significant impact” (FONSI) was appropriate.

However, the overwhelming majority of public comments expressed concern about the potential effects of the project. In the end, the University received so many negative public comments that it could not issue a FONSI.

In Hawai‘i, the environmental review process allows two options in cases such as this one. The first option is to prepare a more detailed analysis of the project and submit this “environmental impact statement” for additional public comment. The other option is to drop the project.

The University of Hawai‘i decided not to prepare an environmental impact statement because it did not have enough money in its budget to cover the more detailed analysis required. What that means for the observatory researchers and the broadcasters is not clear. The issue of radio frequency interference has not been resolved and promises to come up again in the future.



The Hawai'i Environmental Review Process at a Glance

Has anyone ever said to you, “Think before you act”? Have you ever found yourself wishing someone else would think before they do something that seems stupid? Getting government decision makers to think before approving a project that might harm the environment is one of the main reasons behind the Hawai'i “environmental review” process (a formal process that examines potential project affects on the environment). Many projects proposed by Hawai'i state government agencies must go through this process. There are similar review processes set up under the National Environmental Policy Act, and some counties even have similar ordinances.

Federal, state, county, and private projects can all be required to go through an environmental review process. Among other types of projects, any proposed use of state land designated as a conservation district must go through this review. The proposed site of the coordinated broadcast facility is in a state conservation district. So the environmental review was required. Here's how it works:

Step #1: **Environmental Assessment (EA)**

A written evaluation to determine whether an action may have a significant effect

Step #2: **Public Comment** on the EA

Step #3: **Finding of No Significant Impact (FONSI)**

If the project will not significantly harm the environment, a FONSI is issued. There is a period of time during which people or organizations may challenge this finding in court.

Step #4: Environmental Impact Statement (EIS) If the project *may* have significant environmental impact or if the FONSI is struck down in court, an EIS is written to examine a proposed project's:

- environmental effects,
- effects on the community and state social and economic welfare,
- effects on economic activities,
- attempts to minimize adverse effects, and
- alternatives and their environmental effects.

Step #5: **Public Comment** on a Draft Environmental Impact Statement

Step #6: **Final EIS**

The final statement includes public comments and the agency's response to them.

Step #7: **Governor's Approval**

The final EIS is evaluated for acceptability by the governor. If accepted, the project may go forward.



Different Points of View

The proposal to move the radio transmitters to another location on Haleakalā, away from the Haleakalā Observatories, sparked much controversy on Maui. People have many different points of view about whether the transmitters should be moved and if so, where the best location for them would be. Here are seven different viewpoints. READ THE ONE THAT CORRESPONDS TO THE NUMBER YOU WERE GIVEN IN CLASS. You may read the other viewpoints as well, but be sure to read your assigned viewpoint carefully.

Viewpoint #1

Mike Maberry, Assistant Director Institute for Astronomy, Haleakalā Observatories

(These comments on the Draft Environmental Assessment were submitted on behalf of the Institute for Astronomy at the University of Hawai‘i.)

On behalf of the University of Hawai‘i Institute for Astronomy (IfA), I would like to address our interest in the development of a coordinated broadcast facility for Haleakalā.

It has been incorrectly stated that commercial broadcasting preceded astronomy on Haleakalā and that our astronomers and space scientists should have avoided building telescopes near transmitters. The truth is that professional astronomical research came first. In the spring of 1951, Dr. Grote Reber, the father of radio astronomy, chose Haleakalā as one of the best sites in the world to undertake his experiments. Unfortunately, since radio astronomy cannot tolerate any level of “Radio Frequency Interference” (RFI), he soon had to abandon the site when commercial broadcasters began transmitting from the summit. In the ensuing four decades, the level of RFI has increased considerably.

What is Radio Frequency Interference? Have you ever tried to watch television when someone has turned on a vacuum cleaner in the same room? Did you notice what happened to the picture quality? You probably saw distortion, perhaps bands of light and dark or a fuzzy image, caused by competing electrical signals. If so, then you may have also noticed that when the vacuum was moved to the far side of the room the inter-

ference diminished and the picture improved. What you witnessed was a form of RFI. Moving the source (vacuum motor) away from the television reduced the interference. The same would be true for Haleakalā. Moving the source of RFI (the broadcast antennas) away from the sensitive astronomical and space surveillance equipment would have a similar beneficial effect.

The commercial broadcasters have transmitters, buildings and antennae at some six different sites on Haleakalā. Most of these sites are leased from the Department of Land and Natural Resources on month-to-month revocable permits. The University of Hawai‘i owns the 18-acre scientific reserve officially known as the Haleakalā High Altitude Observatory site, or HO. The commercial broadcasters on Haleakalā are currently located right next to and even within HO.

Beginning in the 1970s the RFI generated by the commercial broadcasters on Haleakalā began to seriously impact IfA’s ability to utilize the latest developments in sensor technology. After enduring growing frustration from the effects of RFI, we commissioned a study in 1989 to see exactly what levels of interference exist within HO. According to the International Astronomical Union, an acceptable level of RFI, measured



outside an observatory doing optical or infrared observations, is two microwatts per square meter. We have measured in excess of 184,000 microwatts per square meter.

At 10,000 ft., Haleakalā is obviously an excellent site from which to relay broadcast signals to windward O‘ahu, Moloka‘i, Maui and parts of the Big Island. The Federal Communications Commission (FCC) has received requests for licenses for more than 70 additional transmitters and antennas to be located on Haleakalā. Some of these are essential so that the existing broadcasters can meet the FCC’s mandate for simultaneous digital and analog transmission by the year 2004. If the state granted the requested permits without regard to where the transmitters are placed on the summit, the addition of so many more antennas would constitute both a visual blight and an additional RFI nightmare for IfA. It is therefore only logical for the State and County of Maui to work toward development of a coordinated broadcast facility on Haleakalā.

Technology has progressed such that in a coordinated facility, all commercial broadcasters and their individual antennas currently accommodated at the summit of Haleakalā can be located on two towers. Two additional antenna towers were recommended in the recent Environmental Assessment to allow for future growth well into the next century.

The IfA is preparing a Research Development Plan (RDP) that will identify what types of research can be undertaken at HO. Once the RDP is complete we can develop a Master Plan for our 18 acres (not the whole summit, as some mistakenly believe). However, we can not complete the RDP until we know how much RFI we will have to contend with.

The IfA has been working hard to resolve the problems associated with the cohabitation of astronomy and commercial broadcasters for many years and we support the concept of a coordinated, consolidated broadcast facility.



Viewpoint #2

Kahu (Reverend) Charles Kauluwehi Maxwell, Senior

(These comments reflect Rev. Maxwell's point of view and do not reflect the position of any organization.)

Why do we native Hawaiians get angry whenever something is put on the top of Haleakalā? From ancient times the mariners used Haleakalā as a point of reference. When they looked up and saw the star called Hōkūpa'a, they knew they were in Hawaiian waters. They continued in a northerly direction and the first thing they saw was Haleakalā if they were coming down the Keala i Kahiki channel. "Keala i Kahiki" means the road to Tahiti.

Maui, Moloka'i, Lāna'i, Kaho'olawe were all one island thousands of year ago. This was called Maui Nui a Kama, the Greater Maui. Papa, the earth mother and Wakea, the sky father, created the islands, and Haleakalā is the *piko*, the navel, the center of Maui Nui a Kama. It is the cultural center point of all these islands that were once joined.

Pele, the Goddess of Volcanoes, was born in Tahiti. She tried to find a permanent home by digging craters with her magic 'ō'ō (digging stick) throughout the Pacific. Reaching the Hawaiian Islands, she tried to make a home on each island from the northern islands of Nihoa and Necker to the Big Island of Hawai'i. She dug the crater of Pu'umōiwi on Kaho'olawe and created eruptions at Kanaio. She continued up the south rift of Haleakalā and left a chain of cinder cones which led directly into the crater of Haleakalā. For a while, she resided in Haleakalā but was not satisfied, so she ventured to Hāna by way of Kaupō, causing a great eruption that ran down to the sea. A great battle ensued between Pele and her sister Nā-maka-o-ka-ha'i, the goddess of the sea. Pele was killed and her bones were scattered on a cinder hill called Ka-iwi-o-Pele in Hāna. Being a goddess, Pele manifested herself and went to the island of Hawai'i, where she presently resides at Hale-ma'u-ma'u crater on Kīlauea.

There are shelter sites in Haleakalā crater with carbon dates that show human habitation from the third century. Haleakalā has so many ancient burials. I was privileged to have discovered an *akua kā'ai*, which are remains of ancient kings that were wrapped in sennit (Hawaiian rope made from coconut husk fibers) and placed in a *heiau* (Hawaiian temple). It had spears next to it, and carved carrying sticks. It is considered as one of the most sacred religious items for our people. Everyone that was buried in Haleakalā was considered royalty. No commoner would be buried up there.

For our people it is considered the "pathway to call the sun" and that is where the sun lives. The placing of a telescope on top of the mountain ruins the spirituality of the entire mountain. There is a *heiau* on one of the ridges in the crater where the demigod Maui prepared his sennit to lasso the sun so his mother's tapa could dry. After the telescope was built, the Air Force wanted to put several sensors on the ridges of the crater. I told them that they could not because of the sacred *heiau* that were there. They did not believe me, so they flew me up in a helicopter, and on the three-thousand-foot precipice, there stood the *heiau*. When I was 18 years old, I had climbed up the cliff to see it. My *kupuna* told me about the *heiau*. I also showed them several others. They did not place any sensors on the crater ridges.

Poli'ahu is the goddess of the snow and when Hawaiians see the snow on Haleakalā, they say that Poli'ahu is in residence and is covering the bones of our *kupuna*. That's why when you build a telescope that can be seen from all over, it is an actual blight on the sanctity of Haleakalā. For us it is not just a mountain, it's a sacrilege to desecrate it—like moving the antennas one mile and bringing them down to Kalepeamoā. Kalepeamoā



is named for a chicken demigod that lived in that area, so the whole mountain is for us a very spiritual place. It is a sacrilege to plow it, to take out rock as they did when building the Air Force telescope.

Why step on our culture for the betterment of science? We are the only group of people that can spiritually link to Haleakalā. Every island is named, every river, every gulch is named after Hawaiian gods and goddesses, but people don't respect that. Can you imagine that thousands of years before our people came here in the third century these names existed? It was told to our ancestors by our prophets and spoken about in chants. We did not "stumble" on Hawai'i like Captain Cook did. Our ancestors knew it existed. When they came here in their double-hull canoes, they came equipped with their families, animals, plants, gods and goddess. They lived here thirteen hundred years before being discovered by Western man. They were strong robust people and the world's greatest ecologists.

When Captain Cook arrived, it actually was the end of our race, as we died by the thousands from the common cold and other Western diseases. Now we are fighting this new disease called "progress" that wants to eliminate us and our Hawaiian spirituality and values. We all must bend to ideas of the West and science that threaten our existence in these islands as we know it. Our lands were taken against our will, and we are doggedly trying to hold on to our culture. They want to change it to be like wherever they're from.

Why can't we work together? Why aren't we consulted? As our late King Kalakaua said in his book, *Myth and Legends*: "Soon we will be only footprints in the sand and our song will not be heard."



Viewpoint #3

**Mary M. Evanson, President
Friends of Haleakalā National Park**

(These comments on the Draft Environmental Assessment were submitted on behalf of Friends of Haleakalā National Park.)

We have reviewed the subject document and offer the following comments:

It is stated in the Draft Environmental Assessment (DEA) that both Kalepeamoia and Keonehunuhune [a lower elevation site located on Ulupalakua Ranch] are viable sites for this project from the technical standpoint. We feel that there will be significant adverse environmental impacts if Kalepeamoia is developed, while at the lower site of Keonehunuhune adverse impacts would be negligible. Therefore, we strongly urge that Keonehunuhune or some other site lower on the southwest rift zone be used for this project instead of Kalepeamoia.

The only development now on the summit area of Haleakalā outside the national park has been within lands set aside for Haleakalā Observatories and lands down to and including the FAA low site. This proposed tower project is well outside this developed area, one mile down the mountain and could very well spark demand for other projects in the area. This southwest rift zone is remote wilderness that is little known but worthy of protection either under the state's Natural Area Reserve System or the National Park Service.

The entire mountain of Haleakalā is a visual, cultural and geological resource that must continue to be recognized as being of great significance and vital to our visitors and our local residents. The northeast side of Haleakalā supports dense native forests with heavy rainfall. The southwest rift zone has sparse vegetation and little rainfall but spectacular views and volcanic eruptions up and down the rift zone created a line of colorful cinder cones and pit craters. This

alpine rockland provides visual enjoyment of geological features found nowhere else. The scenic beauty and interpretive possibilities of this area are unlimited and should be preserved. The proposed 199-foot towers would be the highest structures on the mountain; they would be visible from Kula and all of central Maui from Kihei to Ha'ikū. They will greatly impact the values and the environment of Haleakalā and especially the southwest rift zone.

There are concerns about the endangered dark-rumped petrel that must be addressed more fully. The four 199-foot towers would be in the vicinity of petrel nesting burrows and in the flight paths of the birds. Petrels will die, and since the facility will not be manned, any downed injured birds cannot be saved. We should be doing all we can to save what few native birds are left; erecting four 199-foot towers in their path is not the way to go. Only a cursory survey was done for invertebrates and plants; this is not adequate. The DEA states that the road to the site will not be improved, and yet heavy construction equipment of all kinds will be needed. There needs to be more detailed information regarding public health and safety relative to radiation in the area.

In addition, we have serious concerns about the impacts of alien species—such as the Argentine ant, which threatens numerous native insect species, as well as such rare plants as the federally-protected Haleakalā silversword, with extinction—which may be introduced to the national park and surrounding areas by use of the Kalepeamoia site. The unique and fragile biotic character of the Kalepeamoia area is underscored by Haleakalā National Park's designation as a globally important "Man and the Biosphere"



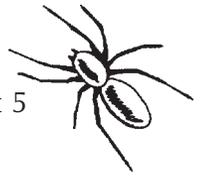
Reserve. Because it is impossible to guarantee that harmful alien species will not be introduced by construction and other human-related activities with respect to this project—and such introductions are potentially permanent and have irreversible consequences—we propose that an alternative site be used, one which is less unique and biotically sensitive.

Alien species issues (introductions, impacts, and control/eradication if introduced) are not adequately addressed in the DEA. Alien species which may be inadvertently introduced could affect invertebrates, plants, birds, and other organisms, some of which are federally protected species. Adequate measures for prevention of alien species introduction must be detailed and these measures included in contractors' specifications for all aspects of the proposed project. Also, contingency plans should be devised to ensure funded eradication measures in perpetuity in the event of any breach of preventive measures (i.e., in the event of an alien species introduction). These issues must be acknowledged and adequately addressed by formal, legal documenta-

tion and prior to any decisions being made about the selection of any site for this proposed project.

If Kalepeamoā continues to be the site of choice a full analysis of the project through an Environmental Impact Statement must be done. In addition to the aforementioned concerns, questions which must be addressed include:

- How will construction be arranged without destroying the existing loose cinder Skyline Drive?
- How big an area might be affected by the project?
- Will radiation impact the petrels?
- Skyline Drive is an official *Na Ala Hele* trail and is used by hikers, mountain bikers, and hunters; how might they be affected by radiation?
- The area is now one of absolute silence except for an occasional helicopter; will there be noise from the facility (such as humming)?



Viewpoint #4

Virginia Parsons, Broadcast Consultant

(These comments are based on those submitted by Ms. Parsons on the Draft Environmental Assessment. They do not reflect the position of any organization.)

I am in full support of the proposed antenna farm project on the summit of Haleakalā and have personally visited the site. The proposed project will help broadcasters become more efficient.

In addition to the transmitters that can be relocated so they no longer interfere with operations at the Haleakalā Observatories, there are transmitters located at lower elevations that could be moved to the new site. All of the FM transmitters could be moved out of the local communities where they are now housed. From the new site, they would require less electricity to operate and have better “line of sight” to carry their signals to the public. Up top, there would be less reception interference than there is at the lower elevations where the towers are currently located. The proposed site will be built away from local housing communities in an area unlikely to be inhabited by development. This avoids future conflicts between development and the transmitters.

More importantly, the reach of the broadcast signal from the proposed summit site will be an enhancement to our civil defense program as it will allow broadcasters to reach almost all points throughout the state in an emergency. No other site offers such coverage. Unfortunately, disasters happen, and we must be prepared to protect the public the best we can. Not looking beyond the moment would be a crime, as lives would surely be lost without effective broadcast coverage.

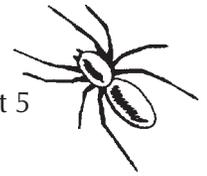
There are no alternatives to the proposed summit site that would provide adequate coverage to the population at large. It appears the only reason that there is any conflict regarding this proposed summit site deals with a “bad” business decision made by a Lahaina broadcaster to pour \$400,000 of concrete onto Ulupalakua Ranch, apparently to

construct an antenna farm on private property so as to avoid the normal state bid process for a landlord at the top of Haleakalā.

Even if this concrete disaster were remotely viable, television broadcast would work only with towers 750 feet high. Even with such high towers, engineers believe they would still lose coverage at this lower-elevation site. And we have not yet determined what kind of coverage these facilities would offer as broadcasters transition from the current analog technology to new digital broadcast technologies. Some radio stations would be able to reach the city in which they are licensed to broadcast from the Ulupalakua site. Others, such as those serving or slated to serve Makawao and Ha‘ikū, would not.

Given the choice between 750-foot towers equipped with flashing strobe lights, and the shorter, less obtrusive towers that would be needed at the higher elevation, I think I’ll take four short (199-foot) sticks. These will have underground wiring. (The proposed summit site area has already been dug and lined with fiber optics.) I doubt that the facility on top of Haleakalā will be the eyesore that was built on Erdman’s ranch.

Realistically, if the nay sayers were to truly evaluate the good from the evil, the facts abound that in an emergency, broadcast transmission is a Godsend, a life-saving warning, a comfort, as well as necessary survival information, which would surely outweigh any opportunistic protest. We need to reach beyond the current reflection and see the real reason for the rivalry—and it has nothing to do with the good of the land or the people ... only rental incomes.



Viewpoint #5

Dr. Donald Mickey, Solar Astronomer, University of Hawai'i Institute for Astronomy

(These comments reflect Dr. Mickey's point of view and do not reflect the position of any organization.)

Astronomers work on high mountain tops in order to have the clearest view possible of objects in the sky. The quality of "seeing" at Haleakalā is not quite as good as it is on Mauna Kea because the prevailing northeast winds heat up as they blow across the crater, causing a small amount of air turbulence around the lip of the crater. But Haleakalā has some advantages over Mauna Kea. The weather is more reasonable on Haleakalā, the road access is better, and because of its lower elevation there is more oxygen available in the atmosphere. An elevation of 10,000 feet is manageable for most people, while 14,000 feet is uncomfortable for most.

Mauna Kea is one of the three best astronomy sites in the world. But Haleakalā is not far behind in the ranking. Astronomers consider it to be among the top five percent of sites for ground-based astronomy.

High up on the slopes of Haleakalā is also a good place to locate television and radio transmitters. From there, the transmitters can cover most of Maui, windward O'ahu, and the Kohala coast of Hawai'i. And, as is true for the observatories, the transmitters are easy to reach by road for the people who need to maintain and repair them.

The problem is that increasingly powerful radio and TV transmitters placed on top of Haleakalā cause interference in the electronic cameras systems in the telescopes and degrade the quality of observations. Both the number and the radiated power of the transmitters has increased over time, so that they now are not only unsightly but could represent a health hazard for people walking the nearby roads. At the same time as the radio frequency interference (RFI) from the transmitters has increased, astronomers have also

become dependent on very sophisticated electronic equipment to do their work. In the past, electronics at the observatories was limited to motors that moved equipment. Now, most equipment relies on high speed computers and sensitive electronic detectors. The more sensitive the instrument the more it is affected by the transmitters.

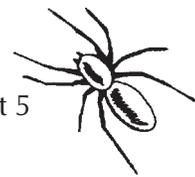
The conflict between the broadcast facilities and the observatories has been growing for many years. Now there is an opportunity to move the transmitters to another location that will work well for them and reduce RFI at the observatories. In 1996, the U.S. Congress passed the Telecommunications Act, mandating a nationwide transition from analog to digital broadcasting. During the next several years, television broadcasters will be putting digital transmission in place while continuing to transmit conventional analog television programming. Eventually, analog will be phased out.

Since the broadcasters will have to replace their transmitters to accommodate digital transmission, this is a good opportunity to relocate the transmitters from their scattered locations around the observatory complex to a different, well-designed location. This move could benefit everyone concerned: The broadcasters would benefit from a modern facility with comparable broadcast coverage to the present site but better separated from people. Astronomers would benefit from dramatically decreased RFI due to a greater distance between the observatory and the transmitters. The mountain itself would shield the observatories from some of the signal put out by the transmitters. Visitors to Haleakalā National Park would also benefit because there would be less visual impact in the summit area.



The International Astronomical Union has set standards for the acceptable level of radio frequency interference measured outside an observatory doing optical or infrared observations. The total allowable interference, summed over all frequencies, is two microwatts per square meter. At Haleakalā Observatories, we have measured in excess of 184,000 microwatts per square meter.

When local broadcasters comply with the Federal Communication Commission requirement to simultaneously transmit in both digital and analog for several years, we expect the RFI levels to more than double at the observatories. This is obviously a problem we need to solve, and moving the transmitters is a good solution.



Viewpoint #6

Iokepa Nae'ole

(These comments reflect the viewpoint of Mr. Nae'ole and do not reflect the position of any organization.)

Through my ancestral connection to these islands, I am bound to its stewardship. By nature as well as by trade, I am a conservationist and stand opposed to any form of *commercial* development, large or small. Periodically throughout my lifelong residency here on Maui, I would ask, "When will it stop?" When will there be enough hotels to satisfy the supposed demands of the visitor industry? When will we finally have enough retail outlets to supply our population with the modern amenities that fill our homes? How many television and radio stations will be sufficient to entertain the masses? How much of our precious land and natural resources will we *all* ultimately sacrifice in the name of technology and progress?

As a native Hawaiian I have always questioned, and will always question, the reasoning and the logic used by developers when they seek government approval for their ventures. I am forever skeptical of their motivations. I detest the reality of development and refuse to accept the lack of control that native Hawaiians have in regulating land use. Rationalization has become my way of dealing with it. Okay, maybe a new resort will provide much need employment for the island. And a new Home Depot will not only provide jobs, but may also stir up some competitive prices. I may need a new recliner so that I can thoroughly enjoy all 200 channels of commercial advertisement, interrupted occasionally by an episode of Gilligan's Island. So there you have my stance on development in general: too much already.

So what about the Haleakalā Observatories and the radio frequency interference caused by transmitters located nearby? We know that the two facilities are technically incompatible neighbors and one of them has to move. So the proposal is to relocate and consolidate existing

broadcast facilities to an area where RFI will no longer affect the mission of the observatories. I partially agree with this proposal. I feel that the scientific activities conducted at the summit should continue and that all efforts be made to eliminate the source of RFI from the summit area. Does this belief come into conflict with my own cultural values? How, you may ask, do I feel about the existence of such a facility that many Hawaiians view as a desecration of sacred land? While I do agree that the summit is a culturally and ecologically sacred place and that the construction of the structures there has no doubt caused extensive environmental change, I also value knowledge and learning.

Hawaiians have always been a race of stargazers. The *kilohōkū* of ancient days would spend many nights perched upon the highest summits gazing, searching, pondering, and prophesying. Without physically departing our *honua* they would take journeys of the mind into the depths of space, seeking answers to questions still asked, and yet to be answered, by modern science and technology. While I regret the loss of habitat for native species, and while I resent the restricted access to the sacred summit area, I know that Hawaiians themselves were explorers whose culture was dynamic and innovative, and accepting of progress in the name of exploration.

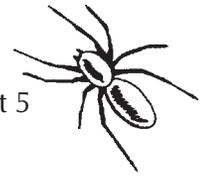
Exploitation, on the other hand, is a subject less open to compromise. Commercial exploitation of land for financial gain is a foreign concept to the Hawaiian culture. Whether it is a resort built on beachfront property or a snorkel tour mooring drilled into the ocean floor, it is considered an affront to nature and culture. As far as I'm concerned, there are only two transmitters that should exist on the mountain: Hawai'i Public Television and National Public Radio. The rest are just *'ōpala*. We waste entirely too much time



inside, insulated from the real world, while watching “The Real World.” I wouldn’t even blink if all of a sudden there were only one station to look at or listen to. Channel surfing would become a thing of the past. Call it a radical point of view; I don’t care. So why don’t we tear down the existing transmitters from the summit area and build two new ones in the Kalepeamoā area?

Getting back to reality, we know this idea won’t fly. We all know money speaks louder than logic. The project will proceed as planned, and transmitters will proliferate at an even more rapid

pace. The mountain will suffer another lesion that many of us will witness every day, quickly to be forgotten with the opening jingle of the KGMB News at Six. In my life I have learned to understand progress. Building more stuff doesn’t mean progress. It just means we’ll have more stuff. Do we need all of this junk? One day my TV will be put to its best use as I throw it over the side of my canoe as an anchor over my best fishing spot.



Viewpoint #7

**Donald W. Reeser, Superintendent
Haleakalā National Park**

(These comments on the Draft Environmental Assessment are a summary of those submitted on behalf of Haleakalā National Park.)

Perhaps the greatest factor protecting the unique cultural and natural resources of Haleakalā National Park is the large extent to which the park is surrounded by conservation lands. The conservation land base comprised of the park, State Forest and Natural Area Reserves and private reserves provides an effective unfragmented area for perpetuating Hawaiian ecosystems. It also buffers the serious threat of invasions of alien plants and animals. The proposed project site is on State Forest Reserve/conservation land, and will increase the footprint of development on the summit ridgeline.

The Draft Environmental Assessment (DEA) is based on speculation in a number of areas that call into question the viability of the proposed site and raise a number of environmental concerns. Any development in the buffer of conservation lands around the park poses a potential threat of new alien invasions to park ecosystems.

A series of issues raised by the proposal follows:

1) The need for the project is to provide broadcast service antenna facilities which will not cause unacceptable levels of radio frequency interference at Haleakalā Observatories (HO). The DEA states: “Relocation of the broadcast facilities to Kalepeamoia *should* decrease RF energy at the observatories to an acceptable level.” It appears that the outcome of the preferred alternative is uncertain, yet the DEA fails to consider the Keonehunehune site as a viable alternative even though it states with certainty of the Keonehunehune site:

“No special beam shaping of the transmitting antennas would be required since the terrain shielding and path loss *would* reduce signal at the observatories to levels will below the International Astronomical Union recommended limits.” In contrast, the Kalepeamoia site would require special directional antenna patterns to reduce RFI at the observatories.

- 2) Page S-9 states, “The antenna facilities will cover less than one acre, and consequently their construction will have minimal impact on natural resources.” Figure III-1 illustrates the footprint at more than four acres. Thinking more broadly, the visual impact of the proposed site will be many thousands of acres.
- 3) The DEA fails to consider the unique high-elevation Haleakalā aeolian environment as a sensitive area. Construction in the area of the Haleakalā Observatories Complex has degraded the fragile environment, reducing the diversity of plants and insects there. This should be considered a prediction of impacts of the proposed project.
- 4) The DEA makes no definite provision for moving the existing antennae towers and other structures if a new facility is built. In V-21, 5.2.1.4 the DEA notes: “It is *anticipated* that the manmade structures in the saddle facility would *eventually* be removed.”
- 5) The proposed site is a known ‘ua‘u flyway. This Endangered Species is vulnerable to flying into foreign objects such as towers, fences, and buildings. The entire broadcast facility would be a “foreign object” into which the ‘ua‘u may fly.



Also, the DEA states in section 5.2.6.1, “There would be *no* unshielded lights to disorient birds in flight.” But in S-5, the section on avifauna, the DEA states, “It is *assumed* that the Federal Aviation Administration (FAA) will not *require* lights on antenna towers.” It appears that antennas on the proposed site would present an aircraft hazard. If lights are required on the antennas by the FAA, navigational and collision hazards to ‘ua‘u would be increased. Visual impacts would be extended to the night sky.

- 6) Based on previous construction projects in the summit area, we know that shipments of construction materials and equipment need to be inspected by a qualified biologist prior to shipment, as well as before access is permitted through the park. Portions of the hydraulic systems of the Air Force Advanced Electro-Optical System telescope were manufactured in killer-bee-infested areas of Texas, for example. Once on Maui, accidental

alien importation could cause environmental havoc before being detected. The DEA’s recommendations for monitoring access and the construction site for at least a year as are important mitigation measures, as inspections will not detect 100 percent of alien organisms. Any construction project in a Hawaiian conservation area poses potential impact to native ecosystems from alien invasions.

If this DEA were to pass public review, inspections both prior to shipping and before transit through the park would be required to attempt to mitigate threats from alien introductions. Increasing the footprint of development on the Haleakalā summit ridgeline sets a precedent for future development of public conservation lands adjacent to Haleakalā National Park. The National Park Service strongly urges that an alternative site to Kalepeamoia be selected for the facility. The potential impacts to the park are too great.

Different Views in the News



The Honolulu Advertiser

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Haleakala antennas debated

TV, astronomy among issues

By Edwin Tanji

Advertiser Maui County Bureau

HALEAKALA, Maui — The chilly, bleak summit of Haleakala just doesn't have enough room for everyone who wants to be there.

Air Force and University of Hawaii observatories track the sun, satellites, asteroids and stars. Television and radio antennas broadcast signals across the state. Hikers and tourists admire panoramic views and austere geologic features. Native Hawaiians see a spiritual center of their culture.

distances in space, observing activity on the sun and tracking satellites in Earth orbit.

Even before the observatories were built, Haleakala also was home to a cluster of broadcast antennas that send television and radio signals to homes on Maui, the Big Island and Windward Oahu.

For FM transmitters, Haleakala's summit is an ideal antenna site, capable of sending line-of-sight signals 200 miles away to Kauai. But radio waves that powerful — as much as 22,000 watts — also overpower astronomical instruments just a few hundred yards away.

Researchers studying data on computer screens are find-

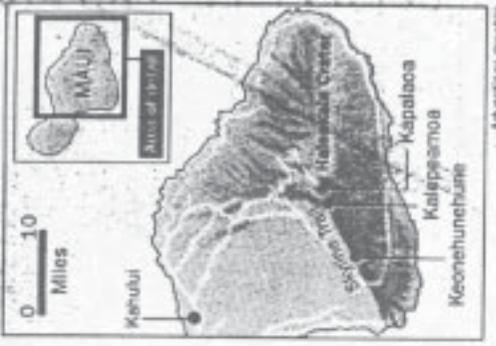
ing television programs popping up instead, consultant Charles Fain said.

"The radio waves can overwhelm everything else," he said.

"It's like when you turn on a vacuum cleaner and your television is on. The electronic discharge from that electric motor causes interference with the television," he said.

The potential addition of antennas is an issue for UH scientists, because research has grown more sophisticated. The scientists must measure radio waves from distant stars and satellites, as well as opt-

See Antennas, Page B4



Advertiser graphic



Antennas: Plans debated for future of Haleakala summit

A 11/27/98

FROM PAGE B1

cal images.

"The real problem is that there are 80 applications for transmitters on top of Haleakala, in addition to the seven or eight that are there now," said Mike Maberry, Maui manager for the Institute for Astronomy.

Maberry said a coordinated broadcast facility is needed that could accommodate the demand for new transmitters, but would not interfere with the work of astronomers. But Kalepeamo, a potential broadcast site at 9,400 feet identified in the environmental assessment, intrudes on a pristine natural area and has brought objections from hikers and Hawaiians.

"To me, it's just one of the most beautiful places on Maui," said Mary Evanson, a Sierra Club supporter and a founder of the Friends of Haleakala National Park.

Panoramic views

Kalepeamo is a ridge line where the Haleakala "Skyline Trail" runs down the southwest slope, offering hikers panoramic views of the Big Island, Lanai, Molokai and Maui, with closeup looks at craters and cinder cones that illustrate Maui's geologic history.

"It's just super special," Evanson said. It would be marred by 190-foot-tall antennas clustered over a five-acre site, with fences and sheds to protect transmitters and generators, she said.

Evanson conceded that she doesn't understand the broadcast technology. But her resolve is firm.

"It's very complicated and it's very difficult for us to understand. All I know is that Kalepeamo is much too precious. We cannot let anyone develop it," she said.

'Spirituality of Haleakala'

Charles Maxwell, the Pukalani Hawaiian cultural specialist, said he would prefer the antennas stay where they are, and the Institute for Astronomy forego further development at the summit.

"Every building, every structure they put up there, to me, is ruining the spirituality of Haleakala from what it was 1,000 years ago," Maxwell said.

He said he has seen evidence of traditional burials around the summit, probably of high-ranking ali'i. Volcanic formations are seen as indicators of the presence of the Hawaiian goddess Pele, who legend says made her home on Haleakala before moving to Kilauea on the Big Island.

There are remains of an ancient heiau on the ridge above Kapalaoa that Maxwell said is associated with the demigod Maui, who is said by legend to have forced the sun to slow down by netting it from Haleakala.

Moving the antennas to Kalepeamo would intrude on yet another sacred area, while allowing the Institute for Astronomy to plan more observatories on the summit, he said. He said he doesn't oppose the antennas, just the proposed site.

Evanson said she would support moving the antennas to a site at Keonehunehune, at 4,400 feet of elevation. An antenna farm for radio transmitters already has been located there.

But television engineers said the lower site would cut off a large number of television viewers. From Kalepeamo, television and radio transmissions can reach half of the Big Island, central Maui to Huelo and Windward Oahu from Makapuu to Laie. From Keonehunehune, the signal would be cut off to parts of Kona, would reach only to Pauwela on Maui and would be lost to all but Makapuu on Oahu.

Dave Moore, director of engineering for KHON-TV, said any site below 8,000 feet "doesn't work." Television signals are sent from Honolulu to Haleakala to be rebroadcast back to the areas blocked from the Honolulu transmitters, he said.

Matter of cost

At lower elevations, he said, the West Maui mountains would block the signal from Honolulu. Stations would have

to install additional transmitters at an extra cost that might not be justified for a relatively small part of a station's audience, he said.

Keith Aotaki, director of engineering for KHNL-TV, said the Haleakala antennas also relay their television signal to the Big Island to transmitters that cover East Hawaii. Moving the Haleakala antenna to a lower elevation could mean moving transmitters on the Big Island, which could prove too costly, he said.

But not moving the antennas would affect Haleakala's role in scientific research. UH officials say without the interference from broadcast antennas, the Haleakala summit could attract three to five new scientific facilities over the next 20 years.

Economic benefit

New observatories would put millions of dollars in construction spending into Maui's economy, while operating expenditures would run at \$1 million to \$5 million a year.

None of it can happen until a decision is made on the antennas, Maberry said. He said the Institute for Astronomy committed itself to preparing a master plan for its 18-acre "Science City" parcel at the summit.

But the institute cannot prepare a master plan until it knows what is possible, he said. If the antennas stay in place, they will affect the plans, he said.

"It will determine what type of equipment we may be able to put up there. With some facilities, we still will be able to do certain types of science," Maberry said.

The final environmental assessment found no significant impact for an antenna facility at Kalepeamo.

But the public has until Monday to comment on the finding and on whether a full environmental impact statement should be prepared.



Questions About the Viewpoints

- 1) Which viewpoint were you assigned to read?

- 2) Do you think the person whose viewpoint you read would be in favor of:
 - moving the transmitters to Kalepeamoā?

 - moving the transmitters somewhere, but not to Kalepeamoā?

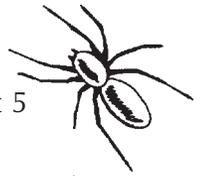
 - not moving the transmitters at all?

 - studying the alternative further?

 - another course of action? (If so, what?)

 - allowing other types of development in the summit area? (For example, in the past there have been proposals to build a tram to take visitors up the mountain to the summit. Do you think this person would support this kind of proposal?)

- 3) What are the person's main arguments for their position?



4) Look at the following list of value systems. Which of these systems do you think are the most influential to this person's point of view? (There may be more than one.) Explain your answer.

Aesthetic	focus on appreciation of intrinsic and subjective qualities, such as the beauty of an area
Cultural	related to maintaining the practices and attitudes of a culture
Ecological	concerned with living things and the function of ecological systems
Economic	related to the exchange of goods and services
Educational	concerned with benefits derived from learning
Egocentric	focus on self-satisfaction and personal fulfillment
Legal	concerned with the law and its enforcement or application
Recreational	related to the use of leisure time

From 'Ō'hia Project, Grades 7-8, Bernice Pauahi Bishop Museum and Moanalua Gardens Foundation, Honolulu, 1992, p. 284. Adapted from Ramsey, J.M., H.R. Hungerford, and T. Volk, "A Technique for Analyzing Environmental Issues," The Journal of Environmental Education, Vol. 21 No. 1, 1989.