

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**National Environmental Policy Act; Outrigger Telescopes Project, Mauna Kea, Hawai'i.**

**AGENCY:** National Aeronautics and Space Administration  
(NASA) Headquarters, Office of Space Science

**ACTION:** Determination of Required Mitigation and Decision

**SUMMARY:** Pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA's policy and procedures (14 CFR subpart 1216.3), NASA has prepared an Environmental Assessment (EA) addressing the on-site construction, installation, and operation of the proposed Outrigger Telescopes Project. NASA proposes to fund the on-site construction, installation, and operation of six Outrigger Telescopes. Because of present funding constraints, while the foundations for six Outrigger Telescopes would be constructed, initially only four Outrigger Telescopes would be installed and operated. Assuming all requisite permits and approvals can be obtained in a timely manner, on-site construction is planned to begin in 2002. If additional funds are obtained later, NASA would fund the on-site installation and operation of Outrigger Telescopes 5 and 6. Installation of these two telescopes would likely begin no later than in 2007. The proposed location of the six Outrigger Telescopes would be adjacent to the twin Keck Telescopes on the W.M. Keck Observatory (WMKO) site, within the Astronomy Precinct of the Mauna Kea Science Reserve, on the summit of Mauna Kea, island of Hawai'i. The Outrigger Telescopes Project is an important element of NASA's Origins Program. The NASA Origins program is directed at answering two basic questions: (1) How do galaxies, stars, and planets form (i.e., "Where do we come from?"); and (2) Are there other planets, aside from ours, that have the conditions necessary to support life (i.e., "Are we alone?").

NASA's EA for the Outrigger Telescopes Project considers alternatives to the Proposed Action and the environmental impacts that could arise from on-site construction, installation, and operation of the proposed Outrigger Telescopes at the WMKO site. Such impacts include adverse effects on properties that meet the criteria for listing in the National Register of Historic Places (hereinafter the

"National Register"), and impacts on the Wēkiu bug, a candidate species for listing under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

Pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended (NHPA) (16 U.S.C. 470 et seq.), NASA also participated in formal consultations to develop measures to mitigate adverse effects of the Outrigger Telescopes Project on Pu'u Hau 'Oki, one cone of a cluster of cinder cones deemed to meet the criteria for a historic property, and on the summit region of Mauna Kea deemed to meet the criteria for a historic district. These consultations have resulted in the issuance of a Memorandum of Agreement (MOA) stipulating measures to mitigate adverse effects on historical/cultural resources.

The EA and its appendices provide an extensive set of mitigation measures including, but not limited to, a Wēkiu Bug Mitigation Plan and a Wēkiu Bug Monitoring Plan. NASA has determined that, with implementation of the below-stated mitigation measures as presented in the EA (with appendices, which include the MOA and other mitigation plans), the Outrigger Telescopes Project will not significantly affect the quality of the human environment; therefore, preparation of an Environmental Impact Statement for the Outrigger Telescopes Project is not required. The EA is incorporated by reference in this decision document.

**DATE:** March 4, 2002

**ADDRESS:** Richard J. Howard, Associate Director, Astronomy and Physics Division, Office of Space Science, NASA Headquarters, 300 E Street, SW, Washington, DC 20546-0001.

The EA for the Outrigger Telescopes Project and the full text of this Determination of Required Mitigation and Decision may be reviewed at:

1. NASA Headquarters, Library, Room 1J20, 300 E Street SW, Washington, DC 20546-0001 (202-358-0167).

2. W.M. Keck Observatory, 65-1120 Mamalahoa Hwy., Kamuela, Island of Hawai'i, HI 96743 (808-885-7887).

3. Jet Propulsion Laboratory, Visitors Lobby, Building 249, 4800 Oak Grove Drive, Pasadena, CA 91109 (818-354-5179).

NASA has sent a copy of the EA and this Determination of Required Mitigation and Decision to each library within the

Hawai'i State Public Library System and to Regional Libraries. Specific addresses for State and Regional Libraries can be found in the appropriate telephone directory and at the following website:  
<http://www.state.hi.us/health/oegc/submissions/librarydist.html>

A copy of the EA and a copy of this Determination of Required Mitigation and Decision have also been sent to university and college libraries within the State of Hawai'i. The full text of the Determination of Required Mitigation and Decision and a limited number of copies of the EA are available to persons wishing a copy by contacting Mr. Howard at the address or telephone number provided herein.

The Executive Summary portion of the EA and this Determination of Required Mitigation and Decision can be viewed on the Internet in PDF format at:  
<http://spacescience.nasa.gov/admin/pubs/outriggers/index.htm>

**FOR FURTHER INFORMATION CONTACT:** Richard J. Howard, Associate Director, Astronomy and Physics Division, Office of Space Science, NASA Headquarters, 300 E Street, SW, Washington, DC 20546-0001. Telephone number (202) 358-2150; facsimile number (202) 358-3096; electronic mail address: [otpea@hq.nasa.gov](mailto:otpea@hq.nasa.gov)

**DETAILED INFORMATION:** NASA has reviewed the EA for the Outrigger Telescopes Project and has determined that it represents an accurate and adequate analysis of the scope and level of associated environmental impacts. The EA and its appendices are hereby incorporated by reference in this Determination of Required Mitigation and Decision.

**Overview:** The proposed Outrigger Telescopes Project would be located at the WMKO site, on Pu'u Hau 'Oki, within the designated Astronomy Precinct in the summit area of the Mauna Kea Science Reserve, island of Hawai'i. The Outrigger Telescopes would consist of six 1.8-meter (m) (6-foot (ft)) diameter telescopes to be placed strategically around the two existing 10-m (33-ft) Keck Telescopes at the WMKO site. The Mauna Kea Science Reserve is leased to the University of Hawai'i (UH) by the State of Hawai'i and is managed by UH. The WMKO site, in turn, is subleased by UH to the California Institute of Technology (Caltech). The existing WMKO Telescopes (Keck I and Keck II) and the observatory site are operated and maintained by

the California Association for Research in Astronomy (CARA), a non-profit corporation of Caltech and the University of California. CARA, as the manager of the WMKO, has requested permission from UH to undertake on-site construction, installation, and operation of the Outrigger Telescopes. NASA proposes to provide funding for on-site construction, installation, and operation of the Outrigger Telescopes, and would receive access to and viewing time at the telescopes for its science programs.

**Proposed Action and Purpose And Need:** NASA's Proposed Action is to fund the on-site construction, installation, and operation of six Outrigger Telescopes at the WMKO site. It is anticipated that the on-site construction and installation of four of the six Outrigger Telescopes, along with on-site construction of the underground structures for Outrigger Telescopes 5 and 6, would begin in 2002 (upon issuance of all State and local permits and approvals), with start of operations anticipated in 2003. If funds were to be available in the future, NASA intends to provide funding for completing the on-site construction, installation, and operation of Outrigger Telescopes 5 and 6, with on-site construction and installation likely to begin no later than 2007.

The Outrigger Telescopes Project is a key element in NASA's Origins Program. The goals of the Origins Program are to understand: How galaxies formed in the early universe; how stars and planetary systems form and evolve; whether habitable or life-bearing planets exist around nearby stars; and how life forms and evolves. Thus, the NASA Origins program is directed at answering two basic questions: (1) How do galaxies, stars, and planets form (*i.e.*, "Where do we come from?"); and (2) Are there other planets, aside from ours, that have the conditions necessary to support life (*i.e.*, "Are we alone?"). NASA's ability to pursue these questions using ground-based systems requires use of a technique known as interferometry. Interferometry is the science of combining the light from two or more widely spaced telescopes to create an even sharper view of the object being observed than could be obtained from any one telescope alone.

NASA has delineated six specific ground-based interferometry objectives to achieve the goals of the Origins Program. These objectives are: (1) detect the thermal dust emissions from dust clouds around other stars; (2) detect the light from and characterize the atmospheres

of hot, Jupiter-mass planets located within approximately 20 million kilometers (12 million miles) of the stars they are orbiting; (3) detect the astrometric signature (*i.e.*, the wobble of a star due to the gravitational influence of an unseen planetary companion) of planets as small as Uranus that are orbiting stars; (4) make images of proto-stellar disks (*i.e.*, disks of dust and gas in space believed to be an early stage of star formation) and stellar debris disks (*i.e.*, clouds of gas or other material remaining after the star is formed); (5) provide high resolution information about some faint objects outside our galaxy; and (6) make high resolution observations of objects within the solar system, including asteroids, comets, and outer planets.

In March 2001, astronomers at the WMKO successfully combined the infrared light from each of the two existing Keck Telescopes as an interferometer (*i.e.*, the Keck-Keck Interferometer). The Keck-Keck Interferometer enables the first two of the above six objectives. Achieving the remaining science objectives, however, requires outrigger telescopes.

**Alternative Sites Considered:** Ten alternative sites to the WMKO site, both inside and outside the United States, were considered. All of the site alternatives, along with the Proposed Action, were evaluated on the basis of two tiers of screening criteria. The Tier 1 screening criteria included: (1) one or more existing large telescopes on the site; (2) adequate relatively level land available to provide sufficient baselines for imaging and astrometry; and (3) site observing quality. The Tier 2 screening criteria included: (1) maximizing sky coverage; and (2) programmatic feasibility (*e.g.*, need to modify existing facilities or add adaptive optics, incremental program costs). Foreign policy and security factors were not taken into account in these considerations. None of the alternative sites were determined to possess all of the attributes considered necessary for achieving all of the scientific objectives established for the Outrigger Telescopes Project. The EA thus focused on the potential environmental impacts of the Proposed Action and the No-Action Alternative.

**Potential Environmental Impacts of the Proposed Action.** The EA evaluated the Proposed Action and addressed the full range of potential environmental impacts. Based on input from governmental agencies, organizations, and the general

public, the EA focused on certain issues -- particularly potential adverse effects on an eligible historic property and historic district and on the Wēkiu bug. An extensive set of mitigation measures and best management practices were developed to reduce or avoid on-site construction, installation, and operational impacts.

The principal areas of potential environmental impact addressed in the EA are summarized below. Mitigation measures to address potential environmental impacts resulting from the Proposed Action are also described briefly. The full text or a description of mitigation measures and best management practices is contained in the EA and its appendices.

**Historic/Cultural Resources:** The Hawai'i State Historic Preservation Division (SHPD) and NASA agree that the cluster of cinder cones -- Pu'u Hau 'Oki, Pu'u Kea, and Pu'u Wēkiu -- satisfies the criteria to be eligible for listing in the National Register as a historic property. Furthermore, the SHPD and NASA believe that the summit region of Mauna Kea meets the criteria to be eligible for listing in the National Register as a historic district. The SHPD also believes that the proposed project would have an "adverse effect" on both the eligible historic property and historic district; but the SHPD further stated that such adverse effects can be mitigated if appropriate measures are adopted. NASA agrees.

No archaeological sites were located in the project area during past surveys, and none were discovered during the construction of either the Keck I or Keck II Telescopes. Review of past grading plans for the site indicated that the entire project area has been altered to such an extent that the probability of discovering burials or other archaeological sites during on-site construction activities associated with the Outrigger Telescopes would be unlikely.

Because the proposed Outrigger Telescopes Project would be Federally funded, Section 106 of the NHPA applies. The NHPA requires NASA to consult with interested parties, including in this case Native Hawaiian groups, concerning the proposed project's effects on historic/cultural resources, and the means to mitigate or avoid adverse effects. In addition to the participants in the Proposed Action, the SHPD, and the Advisory Council on Historic Preservation (hereinafter the "Council"), NASA invited the State Office of Hawaiian Affairs and five Native Hawaiian organizations -- the Hawai'i Island Burial Council, the

Royal Order of Kamehameha I, Hui Malama I Na Kupuna O Hawai'i Nei, Ahahui Ku Mauna, and Mauna Kea Anaina Hou -- to be Consulting Parties. Also, the Office of Mauna Kea Management, the Mauna Kea Management Board, and Kahu Ku Mauna participated in the consultation process.

As an integral part of the Section 106 consultation process, NASA sought and prepared on-site and off-site cultural mitigation measures for consideration by all of the above Consulting Parties. The final cultural mitigation measures (referenced below under "Required Mitigation") have been stipulated in an MOA for signature by NASA, the Council, the Hawai'i State Historic Preservation Officer, UH, CARA, and Caltech as Signatories. As stated in the MOA, the other Consulting Parties have been invited to sign the MOA as Concurring Parties.

**Wēkiu Bug:** The Wēkiu bug is a candidate species for listing by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act of 1973, as amended. The Pu'u Hau 'Oki cinder cone, on which the proposed Outrigger Telescopes would be located, was identified in 1982 as having a population of the Wēkiu bug. The Wēkiu bug population in the summit area of Mauna Kea apparently experienced a 99.7 percent decline between 1982 and 1997-98 for comparable areas surveyed. There is also an indication that the Wēkiu bug population declined on Pu'u Wēkiu and on the plateau north of Pu'u Hau 'Oki, even though these locations were undisturbed by telescope construction. The cause or causes of these population changes are unclear.

In addition to the above areas, a population of Wēkiu bugs was recently discovered on Pu'u Hau Kea. This pu'u was not sampled during any previous arthropod assessments.

The proposed Outrigger Telescopes would be located at the existing WMKO site primarily within the approximately 1.1-hectare (2.8-acre) area graded and leveled in 1985 and 1991, respectively, for the Keck I and Keck II Telescopes. A small amount of Wēkiu bug habitat (less than 0.009 hectare [0.022 acre]) along the sloped crater wall would be directly affected by on-site construction of the proposed project. Accordingly, NASA consulted with the USFWS and also conditioned its Proposed Action on the mitigation measures (referenced below under "Required Mitigation").

**Hazardous Materials:** Some hazardous materials may be required during the on-site construction and installation of the Outrigger Telescopes. For example, paints,

thinners, solvents, and fuel may be transported to the WMKO for specific on-site construction and installation activities. Only the amount of hazardous material that would be used for a specific upcoming activity would be transported to the WMKO site at any one time, thereby minimizing the amount of such material on-site and decreasing the risk of a spill.

Operation of the Outrigger Telescopes would require periodic maintenance, cleaning, and recoating of telescope mirrors and lubrication of the ball bearings on which the telescopes and domes would rotate. The Outrigger Telescopes would follow the same procedures and practices as for the Keck I and Keck II Telescopes. No mercury would be used for the Outrigger Telescopes Project. Mirror washing effluents at the WMKO site are not released into the WMKO septic system, but rather are collected, removed, and transported off-site to an approved disposal location. Hazardous materials including machine grease are collected and removed off-site. CARA has a comprehensive Emergency Response Plan in place to deal with a variety of emergencies and the handling of hazardous materials.

No substantial adverse environmental impacts from hazardous materials would be expected to occur during on-site construction, installation, and operation of the Outrigger Telescopes.

**Hydrology:** It is not expected that the Outrigger Telescopes Project will have an impact on the hydrology of Mauna Kea.

Washing volcanic cinders in the Submillimeter Valley staging area for Wēkiu bug habitat restoration would be accomplished with potable water and would not substantially increase the amount of water that occurs naturally within the relevant portion of the Pohakuloa Gulch drainage system on an annual basis.

Lake Waiiau is fed by a small drainage basin, isolated from the Pohakuloa Gulch system that drains the Submillimeter Valley and Pu'u Hau 'Oki. Thus, Lake Waiiau is not connected hydrologically to the areas where Outrigger Telescopes construction, installation, and operational activities will occur.

If a chemical were to accidentally spill at the Outrigger Telescopes or staging sites, the slow natural transport of dissolved material through the shallow subsurface would allow timely implementation of CARA's Emergency Response



Plan. This would mitigate any problems associated with the spill. The natural transport of dissolved material is slow because the dissolved chemical would remain in the upper few meters of the surface until flushed by ephemeral saturated ground water flows generated by storms and rapid snow melts. Such storms and rapid snow melt events are rare, mostly occurring during the winter season. Further, although the permeability of the cinders and rock is high, existing borings show that shallow subsurface materials at the summit are not saturated with water. Thus, dissolved material transport would be very slow, and timely implementation of CARA's Emergency Response Plan would mitigate any problems associated with a spill

A modest increase (9500 liters [2500 gal/month]) of sewage effluent associated with the WMKO facilities is expected once the Outrigger Telescopes are in operation. The septic/leach-field system for the WMKO facilities is on the southern side of Pu'u Hau 'Oki (i.e., within the Pohakuloa Gulch drainage basin). The small effluent discharge, combined with slow transport rates and microbially-induced oxidation, will effectively preclude the possibility of downslope contamination.

No substantial adverse environmental impacts are expected to occur to the surface and subsurface hydrology of Mauna Kea as a result of on-site construction, installation, and operation of the Outrigger Telescopes.

**Visual Aesthetics:** The existing Keck I and Keck II Telescopes, as well as the other existing telescope facilities within the Astronomy Precinct, are generally visible from within the summit area. The Outrigger Telescopes also would be visible from most locations within the summit area. Like the Keck domes, the Outrigger Telescope domes would be white. However, proper design and grading practices (e.g., such as using natural materials obtained from the project site for fill and surfacing) would minimize the visual impact. The dome ring wall and any necessary retaining walls would be colored to blend into the existing terrain.

Below the summit, the view from the access road of the existing astronomy facilities on the summit is typically blocked by the topography of the mountain. This would also be the case for the Outrigger Telescopes. Portions of the existing telescope facilities are visible from lower elevation areas such as Hilo, Honoka'a, and Waimea. The Outrigger Telescopes' structures would be much smaller than

the Keck Telescopes and would be in close proximity to them. Thus, the proposed Outrigger Telescopes would be almost imperceptible from those lower elevation areas from which the Keck domes are visible.

**Other Potential Environmental Impacts:** Small, but measurable, short-term air pollution impacts due to exhaust and fugitive dust emissions would occur during on-site construction and installation of the Outrigger Telescopes. During the on-site construction and installation phases, the proposed project would generate additional noise from vehicles and construction equipment. Dust control measures and proper noise muffling devices would substantially reduce these potential temporary impacts. Proper engineering design will avoid concerns about slope stability. All other potential types of environmental impacts are either small or non-existent.

**Cumulative Impacts of the Proposed Action.** Cumulative impacts as defined in the Council on Environmental Quality's NEPA implementing regulations (40 CFR 1508.7) refer to the incremental environmental impacts of the action when added to other past, present or reasonably foreseeable future actions. "Reasonably foreseeable," for the purposes of this project, relates to initiation of on-site construction of a new project within the Astronomy Precinct of Mauna Kea within the next seven years - the anticipated longest period for on-site construction and installation of all six Outrigger Telescopes.

Beyond the currently permitted construction of the Smithsonian Astrophysical Observatory Submillimeter Array Telescope, NASA is aware of only two projects proposed for the Astronomy Precinct that currently will be undergoing on-site construction within the next seven years. The Subaru Telescope facility proposes to add an exterior corridor to the control building to serve as access to a new visitor gallery. The UH Institute for Astronomy has a project known as Pan-STARRS that is currently in the conceptual stage and could reach construction within the seven-year time frame. As envisioned currently, Pan-STARRS would consist of four 1.3-meter (50-inch) telescopes, all housed within a single telescope enclosure. While there are several potential sites for Pan-STARRS (including Haleakala on Maui), the most likely site at present is installation of the system in the existing UH 2.2-meter (7.2 ft) Telescope building located on Mauna Kea. There would be no change to the building footprint. These two

proposed projects at most would only add a very small incremental environmental impact, primarily during the period of on-site construction and installation of the Outrigger Telescopes.

One project has been proposed that could involve activities outside the Mauna Kea Science Reserve at Hale Pōhaku – the Mauna Kea Astronomy Education Center (MKAEC). Although the proposed MKAEC would be based primarily at UH-Hilo, the potential exists for an addition and/or expansion to existing facilities at Hale Pōhaku as part of the proposal. If such construction activity were to overlap with the Outrigger Telescopes Project, the cumulative impacts would be confined largely to relatively minor additional traffic on the lower portion of the Mauna Kea Access Road between Saddle Road and Hale Pōhaku, and small amounts of additional fugitive dust and noise at Hale Pōhaku.

**No-Action Alternative.** Under the No-Action Alternative, NASA would not fund on-site construction, installation, or future operation of the Outrigger Telescopes. The potential environmental impacts described for the Proposed Action would not occur. NASA would be able to attain only two of the science objectives discussed in the EA using the existing Keck-Keck Interferometer. The remaining four science objectives would not be met. In addition, the No-Action Alternative would result in economic losses to the State of Hawai'i of the estimated \$7 million to \$8 million for on-site construction and installation of Outrigger Telescopes 1 through 4, and, if budgeted, the \$2.5 million to \$3 million estimated for on-site construction and installation of Outrigger Telescopes 5 and 6. Further, the incremental revenues that would be associated with operation of the Outrigger Telescopes would also be lost to the State. NASA's funding for the Wēkiu bug on-site mitigation and monitoring activities would cease, as would a study of the species' life cycle. NASA's funding for the on-site and off-site cultural mitigation activities presented in the NHPA Section 106 MOA for the Outrigger Telescopes Project also would not occur.

**Required Mitigation.** NASA is committed to the implementation of mitigation, monitoring, and best management practices as presented in the EA and its appendices. CARA has made a commitment to NASA, and NASA will ensure that the mitigation measures presented in the EA and appendices (e.g., Wēkiu Bug Mitigation Plan, Wēkiu Bug Monitoring

Plan, and the Section 106 MOA) will be implemented, incorporated into the Best Management Practices Plan (BMP), and made a part of any construction contracts for the Outrigger Telescopes Project.

Specific mitigation measures can be found in Chapter 4 of the EA and in summary form in Appendix G. Mitigation and monitoring commitments associated with historical and cultural resources can be found in the MOA, Appendix C. Specific mitigation and monitoring commitments associated with the Wēkiu bug and its habitat are contained or referenced, respectively, in Appendices D and E. A draft of the Outrigger Telescopes Project's BMP is provided in Appendix F.

The Wēkiu Bug Mitigation Plan (Appendix D of the EA) was developed to protect the Wēkiu bug and its habitat within and immediately surrounding the WMKO site. The Wēkiu Bug Mitigation Plan includes, but is not necessarily limited to, measures to control dust, hazardous materials, trash, and the potential for importation of alien arthropods during construction and installation, as well as plans for habitat restoration as mitigation for Wēkiu bug habitat affected by construction. The area to be restored will be at least three times the size of the existing Wēkiu bug habitat that will be disturbed. A monitoring plan (summarized in Chapter 4 of the EA, Section 4.1.6, and referenced in Appendix E) was also developed. The Wēkiu Bug Monitoring Plan addresses measures that will be implemented to determine the success of the habitat restoration and other Wēkiu bug mitigation efforts.

On-site historic, cultural, and archaeological mitigation measures in the Section 106 MOA include, but are not necessarily limited to, archaeological and cultural monitoring of the construction area, education of workers on the historical and cultural values of the site, adherence to the BMP, development of a training videotape, and consultation with Native Hawaiian groups and other Consulting Parties in the development and review of the videotape and various plans that bear on the protection of historic/cultural resources.

NASA also will fund an initiative that deals with preservation and protection of historic/cultural resources on Mauna Kea and educational needs of Hawaiians. A local citizens' working group, including Native Hawaiians, will propose the type of opportunities or goals that would best benefit Hawaiians, including Native Hawaiians. This

initiative will be sensitive to Native Hawaiian culture, history, and institutions. NASA will commit \$2 million over a four-year period to this initiative, subject to the availability of appropriated funds.

**Public and Agency Consultation.** NASA consulted on many occasions with Federal and State agencies and Hawaiians, including Native Hawaiian organizations, on the proposed Outrigger Telescopes Project.

One prong of this public and agency outreach was formal consultation with the SHPD, Council, and Native Hawaiian organizations during the NHPA Section 106 process. By the time the formal process had been started, NASA had already attended, made presentations, and listened to concerns at several meetings hosted by Native Hawaiian organizations.

Equally important, NASA strove to engage the public throughout the NEPA process. NASA held two Open House meetings in February 2001 in Hawai'i (Hilo and Kona), and held four Town Hall meetings in October 2001 (Kona, Waimea, and Hilo), to provide the public with additional opportunities to ask questions, express their concerns, and learn more about the project. NASA representatives met, formally and informally, with Native Hawaiian groups, other organizations, and Federal, State, and local officials who have expressed interest in this proposed project.

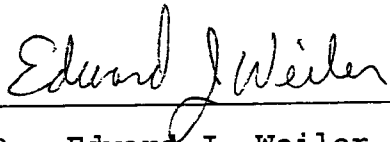
NASA issued a Draft EA on the proposed Outrigger Telescopes Project in late December 2000 for public review and comment. In addition to sending copies of the Draft EA directly to Federal, State, and local agencies, and interested organizations and individuals, a notice of availability of the Draft EA was published in major newspapers on Oahu and the island of Hawai'i. NASA also sent copies of the Draft EA to virtually all of the public libraries in the State of Hawai'i. Twenty-one comment letters were received. NASA carefully reviewed the comments and concerns, conducted additional studies and information gathering where appropriate, and developed responses. NASA's responses to the comment letters on the Draft EA and Open House comments are provided in Appendices I and J, respectively. The text of the EA was modified accordingly.

**Determination:** Based on all of the foregoing, I determine that it is appropriate for NASA to fund the on-site construction, installation, and operation of four Outrigger Telescopes and on-site construction of the underground

structures for Outrigger Telescopes 5 and 6 commencing in 2002. If funds were to be available at a later date, I also determine that it would be appropriate for NASA to fund the on-site construction, installation, and operation of Outrigger Telescopes 5 and 6, commencing no later than 2007. This determination is contingent upon implementation by NASA, CARA, Caltech and UH of stated mitigation commitments and best management practices contained in the EA, including, but not limited to, the Section 106 MOA, the Wēkiu Bug Mitigation and Monitoring Plans, and the Best Management Practices Plan.

In addition, with implementation of the aforementioned mitigation commitments, I determine that the decision to fund and the activities to construct, install, and operate the Outrigger Telescopes will not significantly affect the quality of the human environment. Therefore, preparation of an Environmental Impact Statement is not required.

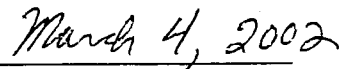
**Decision.** Subject to the above-mentioned mitigation measures, it is my decision to implement funding of the Outrigger Telescopes Project at the WMKO site, located within the Astronomy Precinct of the Mauna Kea Science Reserve, Mauna Kea, island of Hawai'i, as soon as possible.



Dr. Edward J. Weiler

Associate Administrator for

Space Science



DATE