MEMORANDUM

TO: The Honorable Keith Ahue, Chairman
    Board of Land and Natural Resources

    The Honorable Clayton Hee, Chairman
    Office of Hawaiian Affairs

    The Honorable Yukio Kitagawa, Chairman
    Board of Agriculture

    The Honorable John C. Lewin, Director
    Department of Health

    The Honorable Harold S. Masumoto, Director
    Office of State Planning

    The Honorable Yukio Naito, Chairman
    Public Utilities Commission

    The Honorable Dayton Nakanelua, Director
    Department of Labor and Industrial Relations

    The Honorable Winona Rubin, Director
    Department of Human Services

FROM: Mufi Hannemann

SUBJECT: U.S. Department of Energy’s Hawaii Geothermal Project (HGP)
        Environmental Impact Statement

September 29, 1993

As you are aware, the State of Hawaii, with the Department of Business,
Economic Development & Tourism (DBEDT) designated as the lead agency, is
currently cooperating with the U.S. Department of Energy (DOE) in their
preparation of a federal environmental impact statement (EIS) for a conceptual
large-scale geothermal/inter-island cable project identified as the "Hawaii
Geothermal Project".

As a follow-up to the meetings held in Honolulu in July, between state
agencies and DOE staff, I am enclosing for your information summaries of the
Statements of Work (SOW) for the three DOE funded cooperating agencies associated
with the HGP EIS. These federal agencies are the U.S. Army Corps of Engineers,
U.S. Fish and Wildlife Service, and the U.S. Geological Survey. Also enclosed
are the SOW summaries for the subcontractors that Oak Ridge National Laboratory has selected to gather information and develop specific sections of the HGP EIS.

Notwithstanding our participation, as a cooperating agency, it should be clearly recognized that the state is not proposing any large-scale geothermal project for the export of electrical energy to the other islands, and that the federal EIS document is being prepared by DOE specifically to fulfill federal EIS requirements. The State of Hawaii currently supports geothermal energy as a potential energy source exclusively for the island of Hawaii and is not aware of any present efforts, public or private, to undertake a project such as the HGP.

With the assistance of your agency, we will continue to assist DOE in defining the issues and concerns to be addressed in the EIS and provide information in those areas where the state has regulatory authority and technical expertise. We would appreciate your making distribution of the SOW summaries to the appropriate divisions within your department who are currently assisting DOE in their preparation of the HGP EIS.

Thank you for your continued cooperation. Should you have any questions, please contact Energy Program Administrator Maurice H. Kaya at 587-3807.

Enclosure

cc: Ms. Eileen Yoshinaka, DOE-Pacific Site Office
SUMMARY OF COOPERATING AGENCIES’ STATEMENTS OF WORK IN SUPPORT OF THE HAWAII GEOTHERMAL PROJECT ENVIRONMENTAL IMPACT STATEMENT

August 1993
The U.S. Army Corps of Engineers (the Corps) is providing the Department of Energy with technical support to delineate wetlands in 3 geothermal subzones (Middle East Rift, Kamaili, and Kapoho) and along hypothetical overland transmission line corridors on the Big Island. Information from the surveys will be used in the Hawaii Geothermal Project environmental impact statement (HGP EIS) as the basis for evaluating the potential for and significance of impacts to wetlands biota. The Corps has regulatory jurisdiction for actions undertaken in wetlands. This effort is being undertaken because wetlands in these areas, especially the Wao Kele O Puna rain forest, have never been delineated.

The applicability of the Corps' 1987 Wetland Delineation Manual (WDM) to the tropical Hawaiian environment is questionable since it was developed for evaluations in temperate zones. Therefore, the Corps' study will be two-phased. The first phase will be a brief (approximately 2 weeks) ground and possibly helicopter survey of the potentially affected areas to determine: 1) the feasibility of using/adapting the WDM to delineate wetlands, 2) the accessibility of study areas, 3) the viability of using global positioning units and other scientific instruments, and 4) potential problems with surveying the areas. The Phase 1 reconnaissance survey is scheduled for October 1993 and would be headed by the Corps, Honolulu Engineering District, with support from the Corps Waterways Experiment Station, Vicksburg, Mississippi. Based on the conclusions drawn from the reconnaissance study, a second phase of investigation may be funded. The second phase would involve the development of maps delineating wetlands in the geothermal resource subzones and the overland transmission corridors, and an official determination by the Corps of areas to be avoided, areas where permitting will be required, and areas outside Corps jurisdiction.
Literature Review

Published and unpublished documents prepared by the Fish and Wildlife Service (the Service) will be reviewed, and a list of citations with annotated abstracts will be prepared to provide data and information on flora and fauna of the Middle East Rift, Kamaili, and Kapoho geothermal subzones on the Big Island, overland transmission line corridors on the Big Island and Maui, and any other land areas potentially affected by the HGP. The Service will offer comment on the applicability and quality of each reference for use in the HGP EIS.

Forest Bird Surveys

The distribution, abundance, and status of native forest birds in the aforementioned geothermal subzones will be established by field surveys using visual observation and vocal identification in variable circular plots. New data will be compared with previously collected data to establish trends in population and distribution of species. Surveys will be conducted during breeding, non-breeding and transition to breeding seasons.

Endangered Water Bird Surveys

Field surveys will be made of endangered waterbird habitat in overland transmission corridors on Maui and Oahu and in areas surrounding land-sea transition points for a hypothetical submarine cable extending from the Big Island, across Maui, and onto Oahu. The Service will 1) prepare National Wetlands Inventory maps identifying the wetlands in Maui and Oahu transmission corridors, 2) report the waterbird distribution in these areas, 3) define the habitat values of potentially affected wetlands, and 4) assess the potential impacts to endangered waterbirds from transmission corridor construction and operation.
Vegetation Surveys

Field surveys will document the current status of vegetation, including threatened, endangered, and rare species, in the three geothermal subzones identified above. New data will be compared with information obtained in earlier surveys (1979 and 1984). The Service will assess changes in the vegetation distribution and abundance, and data will be analyzed to examine forest-wide changes, such as fragmentation, associated with road development and ongoing geothermal activities in the area. Special attention will be given to the extent and distribution of non-native invasive species. The character and quality of habitat of bird and insect populations will be determined on the basis of the types and distribution of vegetation in the study areas.

Survey for Endangered Hawaiian Hawk, Hoary Bat, and Newell's Shearwater

Because of the lack of data on the presence and distribution of these federally listed endangered species in the potential geothermal development areas, the Service will survey the project area to 1) identify flyways, roosting sites, and nesting sites of Newell's shearwater and other seabirds and assess their abundance; 2) locate nesting sites and record the occurrence of the Hawaiian hawk; and 3) record roosting sites, identify breeding areas, and record the occurrence of the Hawaiian hoary bat. As with the other surveys, these studies will focus on the three geothermal subzones on the Big Island. The Service will seek to determine if there are breeding populations of these species, attempt to assess their success, and note the presence of any native or introduced predators that could further limit populations of these endangered species.

Invertebrate Surveys

The Service has proposed a survey to evaluate arthropod and gastropod diversity and abundance associated with major plant communities in the three geothermal subzones, the rift-zone cave and subterranean habitat, and in disturbed areas, such as roads and trails, that serve as avenues for dispersal of non-native species.
U.S. GEOLOGICAL SURVEY, BRANCH OF VOLCANIC AND GEOTHERMAL PROCESSES

Literature Search and Technical Review

Published and unpublished documents prepared by the U.S. Geological Survey (the Survey) will be reviewed, and a list of citations with annotated abstracts will be prepared to provide geologic data and information for Kilauea East Rift Zone on the Big Island and for marine areas in the Hawaiian Islands. The Survey will offer comment on the applicability and quality of each reference for use in the HGP EIS. Independent reviews of the literature will be provided for the following topics: 1) characterize and quantify background volcanic emissions and their contribution to ambient air quality in the Puna District; 2) groundwater and geothermal hydrology of Kilauea volcano; 3) volcanology and ground deformation with a focus on potential hazard impacts; 4) seismicity of the Big Island and adjacent oceanic areas; and 5) marine geology of the Hawaiian Islands, with focus on natural marine hazards.

Geothermal Fluids Characterization

The Survey will identify geothermal wells on the Big Island that have been adequately characterized with respect to the chemical constituents of geothermal fluids, those that may require additional characterization, and those that are accessible for sample collection and analysis. Where accessible, samples will be taken and analyzed for a full spectrum of chemical constituents. Physical measurements shall also be compiled, including the gaseous and liquid percentage of the resource.

Volcanic Gas Emissions

The Survey will compile data, including direct measurements of Kilauea emissions during eruptive and repose periods, to characterize the background air quality of the Puna District, where the three geothermal subzones are located.
Characterization of and Impact on Groundwater Resources

With this task, the Survey will characterize both the quality and quantity of groundwater resources in geothermal subzones and comment on the potential for impacts to these resources from HGP development. An inventory of groundwater wells, cold and thermal springs, anchialine pools, and water catchment systems will be provided, and these resources will be sampled and analyzed, if necessary.

Volcanic Activity and Deformation Hazard Analysis

Volcanic and deformation hazards will be analyzed on the basis of 1) distribution/age maps of Holocene and historic lava flows and tephra eruptions, and 2) geologically and geodetically determined uplift, subsidence, and extension, for the Kilauea East Rift Zone and along the flanks of Mauna Loa and Mauna Kea, where overland transmission line corridors may pass. To the extent possible, the Survey will estimate the probabilities and magnitudes of occurrence of these events over an assumed 50-year operating life of HGP facilities.

Seismic Hazard Analysis

A seismic hazard analysis of the Kilauea East Rift Zone shall be performed. Historical activity will be summarized in graphic plots. Peak ground accelerations and their uncertainties will be estimated for time intervals ranging from 50 to 10,000 years. The potential for ground motion magnification, liquefaction, surface rupture, and earthquake-induced landslides along the East Rift Zone and along transmission corridors will be evaluated.

Natural Marine Hazards

The potential for natural marine hazards, especially seismic sea waves, rock and land slides, and turbidity currents to impact construction and operation of the undersea transmission cable will be evaluated. Historical occurrences of these phenomena will be compiled.
SUMMARY OF SUBCONTRACTORS’ STATEMENTS OF WORK IN SUPPORT OF
THE HAWAII GEOTHERMAL PROJECT ENVIRONMENTAL IMPACT
STATEMENT

August 1993
Native Hawaiian Ethnographic Survey

The Native Hawaiian Ethnographic Survey has two objectives: 1) it provides information on traditional cultural sites necessary to evaluate potential impacts of the proposed Hawaii Geothermal Project to cultural resources under the National Environmental Policy Act and 2) it initiates agency compliance with other state and federal legislation pertaining to the protection of traditional Native Hawaiian culture (e.g., subsistence and medicinal gathering) and religion. The survey will provide data on the two main project areas for which cultural information is needed: the geothermal resource subzones (GRS) on the Big Island and the transmission route on the south shore of Maui. The survey team will collect only that data necessary for evaluating impacts and will adopt guidelines for maintaining confidentiality. The survey team will also solicit mitigation strategies.

The subcontractors conducting this survey are an unincorporated affiliation of individual consultants (each under separate contract) who use the name Community Action Network Developing Options (CANDO). The principal investigators are Jon Matsuoka, Ph.D.; Davianna McGregor, Ph.D.; and Luciano Minerbi, Ph.D. Their respective fields of expertise at the University of Hawaii at Manoa include: social impact assessment, ethnic studies and Hawaiian history, and urban and regional planning. For this survey, CANDO has added other team members, including a cultural anthropologist and two on-site representatives for the Big Island and Maui.

CANDO team members will conduct the survey in two stages. Tasks for Stage 1 include: 1) identifying Native Hawaiian groups and individuals potentially affected by the HGP and establishing contact with appropriate professionals and community representatives (The study area contains the GRS project area and the Maui project area and concentrations of Native Hawaiians potentially affected by the proposed project. Native Hawaiians to be surveyed need not live in immediate proximity to project areas, but Native Hawaiians so located must be included.); 2) producing a background literature review using archival and other primary sources; 3) preparing a letter report on Native Hawaiian concerns regarding archaeological investigation; 4) developing procedures for maintaining confidentiality of sensitive information; and 5) completing a research design study plan that establishes how CANDO will identify variations in religious beliefs and practices, subsistence or medicinal gathering practices, and other cultural beliefs or behavior pertaining to the project areas. The plan must establish the
subcontractor's methods of assuring that a full range of Native Hawaiian opinions on cultural and religious issues pertinent to HGP will be explored.

During Stage 2, the survey team will select participants for focus group meetings and individual interviews based on a representative sample. Assisted by on-site representatives, the three principal team members will hold meetings (approximately seven meetings consisting of 5-10 participants and a facilitator) and conduct indepth interviews, using appropriate ethnographic techniques, with approximately 40 key traditional cultural practitioners on the Big Island and Maui. After conducting the field survey, team members will analyze data, assess its reliability, and draw conclusions in a final report. To the extent practicable, the report will describe culturally important places and cultural or religious practices that could be affected by the proposed project. The report will also identify the range of Native Hawaiian concerns regarding potential impacts of the proposed HGP on cultural sites, practices, and traditional religion. The report will contain Native Hawaiian recommendations for mitigating potentially adverse effects. CANDO will solicit feedback from survey participants on accuracy and thoroughness of data and will confer with them on matters of confidentiality and release of information.
Cultural Resources Survey

The Cultural Resources Survey has two objectives: 1) it provides information on historic, prehistoric, and traditional sites necessary to evaluate potential impacts of the proposed Hawaii Geothermal Project to cultural resources under the National Environmental Policy Act and 2) it initiates agency compliance with other pertinent state and federal legislation, such as Section 106 of the National Historic Preservation Act. The survey will provide information for the two main project areas examined in the environmental impact statement: the geothermal resource subzones (GRS) on the Big Island and the transmission route on the south shore of Maui. The survey team will determine eligibility of sites for listing in the National Register of Historic Places, identify and evaluate potential effects of the proposed project on eligible sites, and recommend appropriate mitigation and cultural resource management strategies.

Phase I archaeological surveys of both project areas are being conducted under subcontract by International Archaeological Research Institute, Inc. (IARI), a state-approved archaeological firm located in Honolulu, Hawaii. IARI has had extensive experience conducting surveys for similarly large and complex federal projects and has conducted successful archaeological investigations in Hawaii and the Pacific Islands, including one in an area adjacent to the GRS project area.

IARI staff will conduct surveys of both project areas is two stages. In Stage 1, IARI staff will conduct a background literature review of previous archaeological research and other relevant documents (such as aerial photographs and environmental studies). IARI staff will also conduct a preliminary reconnaissance survey of each project area. These preliminary surveys will consist of: a helicopter survey of each project area to identify factors relevant to conducting the full verification survey; an automobile survey to identify access routes, potential survey problems, and historic sites or structures; and a limited ground survey of easily accessible sample areas. Based on this preliminary work, IARI staff will develop two regionally-specific research designs resulting in a predictive model for the GRS project area and a general plan for a reconnaissance survey of the Maui project area. These research designs will provide the basis for locating cultural remains in each of the two project areas and determining their potential eligibility for listing in the National Register of Historic Places.
In Stage 2, IARII staff will conduct a verification survey for each of the two project areas to provide data from a cross section of topographic and geological formations, soil types, and historic land use patterns. Field verification of the GRS predictive model will consist of stratified sampling of an appropriate percentage of the total acreage, along with areas of probable density, to be determined by the predictive model. Field verification in the Maui project area will consist of a pedestrian reconnaissance survey of a 20-mile long, 200-foot wide corridor, following as closely as possible the proposed transmission corridor. Following completion of each survey and analysis of results, the subcontractors will produce a separate final report on the survey of cultural resources for each project area.
Oak Ridge National Laboratory (ORNL) has subcontracted with Dr. Anthony T. Jones and Dr. Craig Smith, qualified marine oceanographers associated with the University of Hawaii, Manoa, to provide technical support in addressing the potential effects of deploying submarine cables from the island of Hawaii to Maui and then to Oahu as part of the Hawaii Geothermal Project. Dr. Jones, who has had previous experience with the Department of Energy's Hawaii Deep Water Cable Program, will address the hard-bottom marine fauna of the coastal zone, reef community, and deep-water community along the submarine transmission routes, and Dr. Smith will address the soft-bottom marine fauna of these areas.

Dr. Jones will (1) identify critical biological and physical components of the coastal zone, including saline anchialine fish ponds, reef and deep water communities, and marine mammals, as appropriate, in the vicinity of proposed cable landing and departure sites and deep-water channels; (2) prepare an assessment of the effects of construction disturbance (both land-based and marine) on the marine environment; (3) prepare an assessment of potential impacts to commercial, recreational, and native subsistence fisheries and fish ponds in the coastal zone and along the transmission cable route; and (4) prepare an assessment of potential impacts to endemic, threatened, endangered, and sensitive species (e.g., Hawaiian monk seals, humpback whales, skates, rays, sharks) from construction and operation of the submarine cable. In conducting this work, Dr. Jones will conduct a background literature search and review; conduct a preliminary reconnaissance survey of the proposed submarine cable departure and landing areas on the islands of Hawaii, Maui, and Oahu; and submit draft reports to ORNL that will provide input for sections of the environmental impact statement (EIS) dealing with marine resources.

Dr. Smith will conduct a literature review on soft sediment communities in shallow water and deep sea environments, provide appropriate information for the marine resource sections of the EIS, and provide input to the formulation of conclusions and recommendations for the marine resources sections of the draft and final EIS documents. He will also review and provide comments on materials prepared by Dr. Jones and other subcontractors.
Electromagnetic Field Effects on Marine Mammals

Oak Ridge National Laboratory (ORNL) has subcontracted with Dr. Adrianus J. Kalmijn of the Scripts Institute of Oceanography, University of California, to provide technical support in addressing the potential effects of electromagnetic fields (EMF) that would be generated by the submarine cables that would be deployed as part of the Hawaii Geothermal Project. Dr. Kalmijn has conducted research on EMF effects on marine organisms since 1963 and has published extensively in this area. Dr. Kalmijn will address the effects associated with one cable with return current through the ocean, the effects of two cables (one for transmission and one for return current), and the effects of electromagnetic fields on the behavior of marine fish and mammals.

In conducting this work, Dr. Kalmijn will (1) identify and assess the potential effects of EMF during normal operation of the submarine transmission cable on marine resources, particularly endemic, threatened, endangered, and sensitive species; (2) prepare an assessment of the effects of EMF on marine biota that could result from damage to the cable system creating stronger than normal fields and identify measures to mitigate potential impacts; (3) prepare an assessment of the effects of EMF on marine biota, particularly endemic, threatened, endangered, and sensitive species that could result from only one of the system cables functioning with current return through the ocean; (4) prepare an assessment of the potential impacts of EMF on behavior patterns of marine biota, particularly endemic, threatened, endangered, and sensitive species; and (5) prepare an assessment of the effects of EMF from AC transmission (rather than DC, as proposed) between Hawaii and Maui on marine biota. The subcontractor will also identify possible mitigation measures to offset any potential EMF effects.

Dr. Kalmijn will conduct a background literature review of existing materials to identify the potential biological effects of EMF in coastal zone, reef, and deep water areas, and to identify other relevant documents concerning the marine environment in the project area; conduct a preliminary reconnaissance survey of the proposed submarine cable departure and landing areas on the islands of Hawaii, Maui, and Oahu to identify areas with the greatest potential for environmental impacts from EMF in the near-shore environment; and submit draft reports to ORNL that will provide input for sections of the environmental impact statement (EIS) dealing with EMF effects on marine biota.
October 14, 1992

Mr. Hiram M. Young, P.E.
State of Hawaii DLNR
Division of Water and Land Development
Kalanikou Building, Room 227
P.O. Box 373
Honolulu, HI 96809

Dear Mr. Young:

Please find enclosed a computer disk (MSDOS 1.2 mb) which contains a copy of our current database for Puna area geothermal waters, for the use of Jonathan Flores. I spoke with Jon today and he indicated that I could sent it to your office.

The disk contains a read.me file which explains formatting, etc.

Please call with any questions.

Sincerely yours,

Christopher W. Klein
Senior Geochemist

CWK:kr
Enclosure