Dr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 South King Street- Rm. 115
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Assessment Notice of Preparation of an Environmental Impact Statement for the Pohoiki Geothermal Transmission Line Project Puna, Hawaii

We have received the attached Environmental Assessment prepared by DHM Planners Inc. for the applicant, Hawaii Electric Light Company, and concur with the decision that an Environmental Impact Statement is required for the project.

Any comments or requests should be addressed to:

Wendie McAlaster
DHM Planners Inc.
1188 Bishop Street,
Suite 2405
Honolulu, Hawaii, 96813

Please find enclosed for your information four (4) copies of the EA/Prep Notice for the Pohoiki Geothermal Transmission Line.

For any questions to the foregoing, please contact our Land Management Division at 548-6460.

Very truly yours,

WILLIAM W. PATY
Chairperson of the Board

Enclosures
cc: Hawaii Board Member
Hawaii District Land Office
All Divisions, DLNR

MM: en
ENVIRONMENTAL ASSESSMENT/
NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT
POHOIKI GEOTHERMAL TRANSMISSION LINE

September 10, 1987
ENVIRONMENTAL ASSESSMENT
NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT
POHOIKI GEOTHERMAL TRANSMISSION LINE

APPLICANT: Hawaii Electric Light Company, Inc.
P. O. Box 1027
Hilo, Hawaii 96720

APPLICANT'S AGENT: Duk Hee Murabayashi (Mrs.)
DHM Planners inc.
1188 Bishop Street, Suite 2405
Honolulu, Hawaii 96813

APPROVING AGENCY: Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

PROPOSED ACTION: Construction of two 69 kV (kilovolt) transmission lines from the proposed geothermal electric power plant at Pohoiki to the vicinity of the Puna Substation in Keaau, Hawaii. It is estimated that the length of each transmission line would be 16 to 18 miles.

The transmission lines would be constructed in two phases; the first by late 1989 and the second line to be completed by 1993.

An Environmental Impact Statement for a two-unit 25 MW (megawatt) geothermal electric power plant, which is the source of power to be transmitted, is being prepared separately by the Puna Geothermal Venture. (See OEQC Bulletin, August 8, 1987),

PROJECT LOCATION: Puna District, Island of Hawaii

ACTION SUBJECT TO CH. 343
(Section 5, Item (1)): Two (2) 50-foot wide rights-of-way could each affect approximately 2.8 miles of State land and 1.4 miles of Hawaiian Homes Lands. All of these areas are in the State Agricultural Land Use District. None are in the State Conservation Land Use District.
APPLICANT

The applicant, HELCO (Hawaii Electric Light Company), a subsidiary of Hawaiian Electric Industries, Inc., proposes to construct, own, and operate the subject transmission line.

Puna Geothermal Venture (a joint venture between Thermal Power Company and AMFAC Energy, Inc.), has a contract with HELCO to develop a two-unit 25 MW geothermal electrical power plant to supply the electric power that will be transmitted via the proposed line.

GENERAL DESCRIPTION OF PROJECT CHARACTERISTICS

Location

The project is located in Puna District, Island of Hawaii (Exhibit 1). The transmission lines would originate at the site of the proposed geothermal power plant at Pohoiki and terminate in the vicinity of HELCO's Puna Substation which is adjacent to the former Puna Sugar Mill in Keaau.

Objective

The objective of the project is to transmit 25 MW of power from the natural energy source at Pohoiki to the Island-wide power grid, the nearest point of which is in the vicinity of the Puna Substation.
Physical Characteristics

The project consists of two separate sets of overhead electric transmission lines energized at 69 kV. The two sets of lines would transmit a total of 25 MW.

The two transmission lines will each require a right-of-way (ROW) between 40 and 50 feet wide. Each transmission line would consist of three conductors and a shield wire. The three conductors would be suspended from insulators supported on poles of between 57.5 and 67 feet in height, and the shield wire would be attached to the top of the pole. (Exhibit 2). The poles would be placed between 300 and 600 feet apart. There would be a minimum ground clearance of 30 feet between the lines and the ground at the point of maximum line sag.
EXHIBIT 2 Typical 69kV Line Spacing and Line Sag
**Route Selection Methodology**

1. **Alternatives:** Three alternative methods of transmitting electric power from the geothermal plant to the Puna Substation were initially evaluated: underground cable, submarine cable, and overhead line. Evaluation of the underground transmission line alternative found that it would cause significant adverse impacts on soils, vegetation and wildlife because of the extensive trenching required to bury the lines. A potential submarine cable route would be about 13 miles in length, however it would still require about 12 miles of overland transmission between the ocean and the origin and destination points, as shown in Exhibit 1. This distance nearly equals the length of a typical overland route between the two points. Also, both the underground and submarine cable alternatives are significantly more costly than overhead transmission lines would be.

An overhead transmission line is the most economical alternative. It is also the least environmentally disruptive since the area between poles remains relatively undisturbed. Based on economics, environmental considerations, and system reliability, the overhead transmission line alternative was selected.

2. **Broadscale Analysis:** After selection of the overhead line as the more desirable method of power transmission, the study area was examined to identify broad corridors where overhead lines would have the least overall environmental impacts. This broadscale analysis was conducted by reviewing available information and by preparing maps at 1:24,000 scale showing exclusion areas, geophysical, biological, socio-economic and cost constraints. A total of 15 sub-factors were mapped to show relative constraint areas. Areas of high constraint were shown in dark tones, medium constraint by grey tones, and low constraint by light tones. The resulting
composite maps revealed the areas of least environmental constraint corresponding to the lightest tones on the maps. Using this method, corridor areas ranging in width from one quarter mile to more than one mile were identified by linking the areas of least constraint to provide a continuous connection between the geothermal power plant site and the Puna Substation. The corridor areas are shown on Exhibit 1.

3. **Field Survey/Detailed Analysis:** On-site field surveys were performed for the corridor areas. Field surveys include the following disciplines: geology (soils), archaeology, botany, wildlife, insect, and visual analysis.

The field survey data was mapped at a scale of 1:24,000 on topographic maps prepared from USGS sources.

4. **Route (Alignment) Selection:** Two transmission alignments were selected after thorough analysis of the field survey data. An environmental impact statement (EIS) will be prepared for the entire corridor areas and selected alignments in accordance with the requirements of Ch. 343, Hawaii Revised Statutes (HRS). A detailed account of the route selection study will be a part of the EIS.

Due to the systematic route selection methodology being utilized, many of the potentially adverse environmental impacts of the resultant transmission line routes will have been avoided or minimized.
SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

The corridor areas and selected alignments are entirely within the State Agriculture Land Use District. The affected environment includes large areas of former sugarcane fields, vacant lava flow lands, productive agricultural lands, and agricultural subdivisions. Hawaiian Home Lands, private, and state-owned lands are affected.

Based on a review of existing information and maps, as well as the field surveys, no rare or endangered species or wetlands would be affected. Generally, the vegetation within the corridors consists of grassland and scattered, immature Ohia trees. Native birds seen in the area ('Elepaio and 'Io) are not dependent on specific locations and favor higher elevations. Native species of insects were found in the underground habitats of caves and lava tubes.

Several archaeological and historic sites were located in the corridor areas and it is likely that there are others which were not discovered.

The corridors cross the privately-owned agricultural subdivisions of Ainaloa, Orchid Land Estates, and Hawaiian Paradise Park. These subdivisions contain hundreds of one and three-acre lots, however the existing developed density is quite low. Some roadways in the subdivisions have existing electric distribution lines along them.

IDENTIFICATION AND SUMMARY OF IMPACTS

A significant beneficial impact to the public and to the economy of the County of Hawaii would be the distribution of 25 megawatts of electric power generated from local natural resources. Over the long-term, it is likely that this power would assist stable growth of the Island's economy.
The acquisition and restricted use of land for the two rights-of-way will impact affected landowners. However, cultivation of row crops or grazing may be acceptable within the ROW. Installation of the poles and lines would have little physical impact except at the actual pole site. Maintenance access will not pose significant impacts to the neighboring environment.

Current research indicates that there would be no biological impacts on human health from 69 kV transmission lines.

No significant impacts on fish, wildlife, native vegetation, historic sites or parks are expected. The actual pole location and span between the poles can and will be adjusted to avoid sensitive areas. The potential routes do not affect State Conservation or Urban Land Use Districts.

Because portions of the potential routes are near existing roadways, there is potential for continuous view exposure of the transmission line. However, it is anticipated that there will not be a significant visual impact on the general public for two reasons. The first is that the existing environment is not pristine and includes utility poles and power lines similar to those which are proposed. The second is that screening methods would be applied during the final route alignment in order to reduce the visibility of the proposed lines. There may be some visual impacts on individual residents, however, where existing view planes could be affected.
PROPOSED MITIGATION MEASURES

Proposed mitigation measures pertain primarily to screening the view of the poles and lines from Keaau-Pahoa State Highway or other vantage points where the public might enjoy the scenic beauty of the area. This technique involves setting the poles and lines back from the State Highway and placing them behind trees or other existing visual features.

To reduce the impact on the view planes from existing residences, all Urban State Land Use Districts and areas designated for urban use on the General Plan of the County of Hawaii have been avoided. However, where the final alignment passes through an existing agricultural subdivision, efforts will be made during final alignment to locate the lines and poles to affect the least number of existing residents.

Transmission line rights-of-way through subdivisions will also offer the opportunity to place distribution lines on the same poles in areas currently not serviced by electricity. This will reduce the cost of providing service to these areas.

A archaeologist will investigate the final transmission alignment to identify any additional sites which were not identified in previous field surveys. Based on the archaeologist's recommendations, mitigation measures will be undertaken to preserve or avoid significant sites.

DETERMINATION

Based on the potential of the proposed project to effect the environment, Department of Land and Natural Resources has determined that an environmental impact statement will be prepared in accordance with Chapter 343, HRS.
AGENCIES CONSULTED IN THE ROUTE SELECTION STUDY AND ENVIRONMENTAL ASSESSMENT

Private:
- Puna Community Association
- AMFAC, Inc.
- Bishop Estate

County:
- The Honorable Dante Carpenter, Mayor
- Department of Planning
- County Council

State:
- Department of Agriculture
- Department of Business and Economic Development, Coastal Zone Management Program
- Department of Business and Economic Development, Energy Division
- Department of Hawaiian Homes Lands
- Department of Health
- Department of Land and Natural Resources, State Parks, Outdoor Recreation and Historic Sites
- Department of Land and Natural Resources, Division of Forestry
- Department of Land and Natural Resources, Office of Conservation and Environmental Affairs
- Department of Land and Natural Resources, Division of Water and Land Development
- Department of Transportation, Division of Highways
- Land Use Commission
- Office of Environmental Quality Control
- University of Hawaii, Environmental Center

Federal:
- Department of the Interior, Fish and Wildlife Service
- Geological Survey, Volcano Observatory
- Soil Conservation Service

AGENCIES TO BE CONSULTED IN THE PREPARATION OF THE EIS

Private:
- Various Puna community associations
- Major landowners

County:
- The Honorable Dante Carpenter, Mayor
- Department of Planning
- County Council

State:
- Department of Business and Economic Development
- Department of Hawaiian Homes Lands
- Department of Land and Natural Resources
- Department of Transportation
- Office of Environmental Quality Control
Other Parties or Agencies:

Other parties or agencies will be contacted through the normal EIS review process or other public notices as part of the project’s public involvement program.

Note on Public Involvement:

Two sets of meetings have been held, the first in November, the second in December of 1986. Each set consisted of a workshop for government agencies in Honolulu and in Hilo, and a public meeting in the evening at Pahoa. Government agencies were invited through written notices based on the OEQC mailing list. The public was invited through notices in newspapers, radio announcements and letters sent to the community associations in Puna. Additional informal meetings are scheduled in March, 1987 and formal meetings are planned in late spring or early summer.
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
AQUACULTURE DEVELOPMENT PROGRAM
335 MERCHANT STREET, ROOM 359
HONOLULU, HAWAII 96813
(808) 548-5495

FROM THE DESK OF:

John S. Corbin, Manager
Aquaculture Development Program

Thought you'd be interested.

Please review and comment by ____________________________.

Please return by ____________________________.

As you requested.

More information forthcoming.

Let's discuss this soon.

Manalu,

Thought your geothermal people might be interested in the progress at the facility. These projects really look very promising for commercialization.
MEMORANDUM

TO: William W. Paty
FROM: John Corbin
SUBJECT: NELH Board Meeting, September 10, 1987

September 15, 1987

The following summarizes the results of the meeting:

1. **Motion** - Minutes of the previous meeting we accepted.

2. **Motion** - UH/Department of Energy (DOE) fiber optics test project at the Puna Geothermal Research Facility was accepted. Note a 50% reduction in fees because it was UH project.

3. **Motion** - The Advanced Technology Engineered Projects, Inc. OTEC agriculture project (you asked about this one) was approved in concept. Dr. Marty Vitousek, UH is involved and made presentation. This builds on the long-standing state supported OTEC strawberry project. Board asked for letters of intent from customers before final approval is given.

4. **Highlights of Direction Report.**
   a. Emergency need for B&F to process current CIP request for NELH pipeline deployment funds was discussed. DBED to set up meeting with Craven and B&F to emphasize emergency. Pipes ready to go.
   b. Upgrades for Geothermal Research Facility also need to be processed by B&F quickly.
   c. Badly needed additional staff being asked for in supplemental budget.
d. Critical NELH/HOST relationship issues being discussed by Bass and Huizingh. Proposal to come to NELH and HTDC Boards next meeting.

e. NELH proceeding on constructing shade clothe structure for Visitors Center.

f. DOE Open Cycle OTEC Project produced freshwater from seawater for the first time in history! They have yet to issue press release.

g. Puna Geothermal Research Center demonstration projects are going very well, for example, papayas, koa and clothe have been dried and volcanic glass has been shaped into art objects successfully.

Commercial potential of this facility (it as incubator and surrounding land as industrial park) is tremendous. Papaya and other dried fruits in great demand by candy manufacturers. Koa currently is shipped to Mainland and drying time can be reduced from one year to four weeks by doing it here. Amfac interested in drying potentials. Japanese clothe drying company having exhibit (Natural Energy Clothing) in Tokyo. Market potential of volcanic glass objects is huge.

Note - Tie in wood drying activities with DLNR's forest products development goals.

5. Meeting ended with a discussion of the need for more staff and particularly a full-time water manager.

cc: Libert Landgraf
AGREEMENT NO. DE-AC07-IOO710
BETWEEN
UNITED STATES OF AMERICA
AND
GEOTHERMAL TECHNOLOGY [DRILLING] ORGANIZATION
This Agreement is by and between the United States of America (hereinafter called the "Government"), represented by the undersigned Contracting Officer of the United States Department of Energy (hereinafter called "DOE"), and the Geothermal Technology [Drilling] Organization (hereinafter called "GTO" [GDO]), an unincorporated association organized and existing under the laws of the State of California.

II.
WHEREAS, DOE has the authority, responsibility and technical capability for the performance of research and development activities relating to geothermal technology; and
WHEREAS, GTO [GDO] has been organized by industrial entities and others (hereinafter collectively called "Members") to provide a forum for advancement of geothermal technology including providing a means for funneling funds from one or more Members (hereinafter called the "Participating Members") into various research and/or development projects relating to geothermal technology which the DOE will cause to be conducted; and
WHEREAS, DOE has determined that it is in the Government's best interest to enter into an arrangement with GTO [GDO] wherein the parties will share in the cost of such geothermal research and development; and
WHEREAS, this Agreement is authorized and executed under the Department of Energy Organization Act (Public Law 95-91) and other applicable law.

NOW, THEREFORE, the parties agree as follows:

I. DESCRIPTION OF PROGRAM
The purpose of this Agreement is the development of specific technology that can in the short term have a high probability of yielding short-term benefits in the areas of reservoir performance and energy conversion technology [reduce the cost of drilling, completing and/or logging geothermal wells]. During the term of this Agreement, the parties shall agree upon specific projects to be performed. The agreement of the parties with respect to each project shall be set forth in a Project Letter Agreement ("PLA"). The PLA shall identify the Participating Member(s) funding the project and shall describe the scope of work for the project, the estimated cost of the work, the estimated period of performance, and such other terms as may be appropriate but which are not inconsistent with the provisions of this Agreement. Each PLA shall become effective when signed by the GTO [GDO] and the DOE and shall be subject to all the terms and conditions of this Agreement.

II. PERFORMANCE OF PROJECTS
Idaho National Engineering Laboratory [Sandia National Laboratories], owned by the Government, is operated by EG&G Idaho, Inc., an Idaho corporation (hereinafter called EG&G Idaho), which EG&G Idaho [Sandia] is a wholly-owned subsidiary, and the Government, represented by DOE. DOE will cause EG&G Idaho [Sandia] to perform (either directly or by means of one or more subcontractors) the projects described in each PLA on behalf of the Government. GTO [GDO] understands that EG&G Idaho's [Sandia's] performance of the projects will be governed by the terms and conditions of the above-referenced Contract No. DE-AC07-1001570 [DE-AC04-76DP00789] between EG&G Inc. [AT&T Technologies Inc., formerly the Western Electric Company], of which EG&G Idaho [Sandia] is a wholly-owned subsidiary, and the Government, represented by DOE. DOE will cause EG&G Idaho [Sandia] to perform (either directly or by means of one or more subcontractors) the projects described in each PLA on behalf of the Government. GTO [GDO] understands that EG&G Idaho's [Sandia's] performance of the projects will be governed by the terms and conditions of the above-referenced Contract No. DE-AC07-1001570 [DE-AC04-76DP00789]. Said terms and conditions include, among other things, provisions dealing with property, cost allowability, technical information, records, reports and inspection, accounting and financial records, security, patents and classification.

III. TERM
This Agreement shall become effective upon the date it is fully executed and, unless sooner terminated under the provisions of Article VIII hereof, shall continue for a period of 24 months thereafter unless extended by mutual agreement of the parties; provided that this Agreement shall continue to be effective with respect to any PLA that has not been completed or otherwise terminated as of the expiration date of this Agreement.

IV. FUNDING, COSTS AND PAYMENT
A. The estimated cost of each project shall be set forth in the PLA. GTO [GDO] shall be responsible for securing from the respective Participating Members funding for fifty-one percent (one-half) of such estimated cost. DOE shall use its best efforts to perform each project within the estimated cost. Should it appear that the cost of performance will exceed the estimated cost, DOE will so notify GTO [GDO] as soon as practicable. If the involved parties agree to continue the project, the estimated cost shall be appropriately amended. DOE shall have no obligation to continue or complete performance of the work at a cost in excess of the agreed estimated cost. If the actual cost of the work is less than the estimated cost, GTO [GDO] shall receive a refund pursuant to Paragraph D of this Article IV.