

SPECIAL PERMIT	
JUN 19 1978	
Petition Received	_____
Maps	_____
Action Span	6/19/78 - 8/3/78
Action Date	7/18/78
Recordation	8/7/78

SP78-307 - DEPT. OF PLAN. & ECON. DEV. (A) (HAWAII)

8/28/18

Send Decision/Order.
to OLMA. Land Mgmt
Div.



Planning Department

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

LARRY S. TATHROCCO

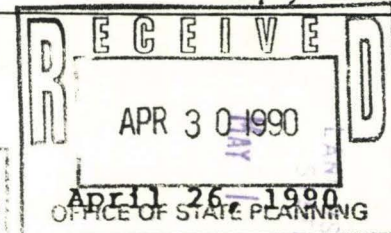
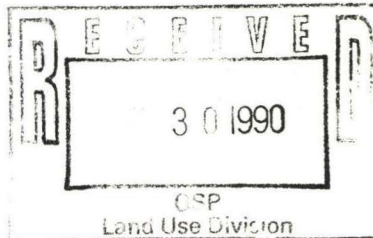
Mayor

Duane Kanuha

Director

William L. Moore

Deputy Director



30855

APR 26 1990
OFFICE OF STATE PLANNING
HAWAII

COPY
Mr. Steve Philips
P. O. Box 1267
Keaau, HI 96749

Dear Mr. Philips:

Special Permit No. 78-307 (LUC 392)
Hawaii Geothermal Project (HGP-A)

Y This is to acknowledge receipt of your letter of March 13, 1990. Please accept our apology for this long delay in responding.

The HGP-A environmental monitoring program was instituted initially by the State's Department of Planning and Economic Development to provide data regarding the emissions of several potential pollutants during normal and standby operations and to provide information on the ambient hydrogen sulfide concentrations in the community adjacent to the HGP-A Project. The HGP-A Plant was placed into operation in July 1981 and until the HGP-A well was shut-in in December of 1989, its emissions and the ambient air quality of surrounding community was monitored.

While the data collected through the monitoring program is subject to interpretation, we do not share your conclusion that "all monitoring to date has been misleading and unreliable..." According to the reports submitted to us, the equipment used to collect the data was serviced and calibrated on a regular basis. While we have not made any interpretation of the data, we believe we have historical record from which comparative analyses can be made.

On the other hand, the DOH monitors and data you refer to have not been as readily available. At this time, we do not have enough information from these DOH monitors and data to conclude, as you do, that there are "conflicts" between the HGP-A operator's monitors and the DOH monitors. It is our understanding that the DOH is continuing to monitor the ambient air quality and that Puna Geothermal Venture is continuing its air quality monitoring program. The results of both efforts will increase our informational base.

Mr. Steve Phillips
April 26, 1990
Page 2

The October 1981 numbers you refer to were then the best available information. They are the results of a monitoring effort which indicated that the average H₂S was 0.003 ppm and the maximum was 0.013 ppm. We have every reason to believe that these numbers are not incorrect.

We do not believe there is any current violation of SP78-307. With no fluids flowing from the HGP-A well, Condition No. 6 is currently being met as every precaution is being taken to reduce any nuisances, whether it be noise or fumes which may affect the residents and properties in the immediate area.

We will take your comments on the placement of monitoring points under advisement for any future monitoring requirements which may be placed at HGP-A. At this time, we have no authority to mandate your suggestions.

Again, we apologize for the delay in responding. Thank you for sharing your thoughts with us. Please feel free to contact us.

Sincerely,


DUANE K. KURE
Planning Director

REM:scb

cc: DOB
Civil Defense
Governor Waihee
✓ DBED
Dr. Don Thomas
R&D
Sus Ono
NELH



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

LAND USE COMMISSION

GEORGE R. ARIYOSHI
Governor

CHARLES W. DUKE
Chairman

SHINICHI NAKAGAWA
Vice Chairman

Suite 1795, Pacific Trade Center, 190 S. King Street, Honolulu, Hawaii 96813

February 9, 1979

COMMISSION MEMBERS:

James Carras
Colette Machado
Shinsei Miyasato
Mitsuo Oura
George Pascua
Carol Whitesell
Edward Yanai

GORDAN FURUTANI
Executive Officer

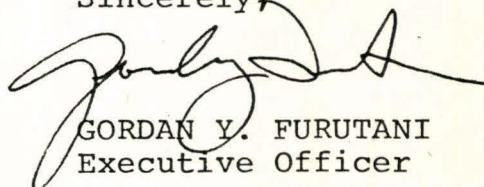
Mr. Sidney Fuke
Planning Director
Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

Subject: SP78-307 - Dept. of Planning & Econ. Dev.

In reference to our letter to you dated
July 21, 1978, enclosed is a copy of the
Decision and Order on SP78-307 for your informa-
tion and records.

Sincerely,



GORDAN Y. FURUTANI
Executive Officer

Encl.

cc: DPED

DLNR, Division of Land Management

BEFORE THE LAND USE COMMISSION
OF THE STATE OF HAWAII

In the Matter of the
Petition for Special Permit
of DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

) SP78-307

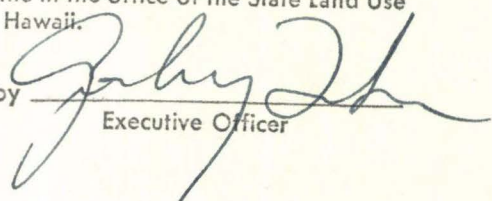
) DEPARTMENT OF PLANNING
) AND ECONOMIC DEVELOPMENT
)
)
)

This is to certify that this is a true and correct copy of the
Decision and Order on file in the office of the State Land Use
Commission, Honolulu, Hawaii.

FEB 9 1979

Date

by


Executive Officer

DECISION AND ORDER

BEFORE THE LAND USE COMMISSION
OF THE STATE OF HAWAII

In the Matter of the	)	SP78-307
Petition for Special Permit	)	
of DEPARTMENT OF PLANNING	)	FINDINGS OF FACT,
AND ECONOMIC DEVELOPMENT	)	CONCLUSIONS OF LAW AND
	)	DECISION AND ORDER
	)	

The Land Use Commission of the State of Hawaii, having duly considered the entire record in the above entitled matter, makes the following findings of fact and conclusions of law.

FINDINGS OF FACT

1. The Petition for Special Permit was filed by the DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT, to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-1: portion of 2.

2. The subject property is located along the east-side of Pohoiki Road, approximately one (1) mile makai of Lava Tree State Park.

3. The geothermal research facility, identified as the Hawaii Geothermal Research Station, would include: a power generation system and associated equipment; a research facility to test electric and non-electric applications of geothermal resources; and a visitor information center facility.

4. The flow tests are intended to provide more information about the characteristics of the geothermal well identified as HGP-A and the Kapoho geothermal reservoir.

5. The subject 4.1 acre area is a portion of a larger 353 acre parcel which is owned by the Kapoho Land and Development Company. The Department of Planning and Economic Development has received authorization from the landowner to apply for the Special Permit.

6. The County of Hawaii's General Plan Land Use Pattern Allocation Guide Map designates the subject area as Orchards. Present County Zoning is Agricultural 1-acre (A-1a).

7. The Land Study Bureau's overall master productivity soil rating for agricultural use is Class "E" or "Very Poor" for the subject site.

8. Surrounding land uses include scattered residences, diversified agriculture such as papaya and foliage, and vacant lands. Leilani Estates subdivision is located approximately 1,000 feet south of the subject area at the subdivision's closest boundary. Lanipuna Gardens is less than 1,000 feet from the area under consideration in an easterly direction. The closest dwelling is approximately 2,500 feet west of the subject property.

9. Access to the subject area is directly off of Pohoiki Road.

10. An environmental impact statement for the project has been prepared and accepted by the Governor.

11. The State Department of Agriculture has stated its support of the Special Permit application. The department believes that the potential benefits of the project to agriculture would greatly outweigh the potential cost.

12. The State Department of Health has recommended to the applicant that nearby residents be informed of future plans and precautions at the project site.

13. The County Department of Research and Development has in part noted that the environmental impact of the project appears to be minimal and that hopefully a viable alternate energy source may be developed.

14. The County Fire Department, Department of Water Supply, Police Department, Department of Public Works, Hawaii Electric Light Co., Inc., and State Department of Transportation had no objections to the application for Special Permit.

15. The County Planning Department has recommended approval of the Special Permit application.

16. The Hawaii County Planning Commission conducted a public hearing on the application for Special Permit on February 23 and April 27, 1978. At that time, several representatives of the Petitioner testified in support of the request, while four (4) persons testified in opposition. One person questioned the impact and benefits to be derived from the geothermal project.

CONCLUSIONS OF LAW

1. "Unusual and reasonable" uses other than those which are permitted in an Agricultural District may be permitted by Special Permit pursuant to HRS Chapter 205-6, and the State Land Use Commission District Regulation, Part V.

2. The approval of the subject request would be consistent with the State Land Use Law and Regulations. The Land Use Law and Regulations are intended to preserve, protect, and encourage the development of lands in the State for those uses to which these lands are best suited in the interest of public health and welfare of the people. The Agricultural

District category, within which the subject area is situated, includes those lands with a high capacity or potential for agricultural uses. It also includes lands surrounded by or contiguous to agricultural lands and which are not suited to agricultural and ancillary activities by reason of topography, soils and other related characteristics. The subject area is largely covered by 'a'a lava from the 1955 flow, and is classified as Class VIII by the U.S.D.A. Soil Conservation Service. This class of soils is the lowest in the Soil Conservation Service's rating system. The Land Study Bureau's overall master productivity rating for these soils is Class "E" or "Very Poor". Although it is possible for some form of agricultural activity to be conducted on these soils, as evidenced by the surrounding agricultural uses, it is determined that the use of this parcel for the proposed activities will not adversely affect the agricultural potential of the region, the island, and the State.

3. The proposed use will not substantially alter or change the essential character of the land and its present use since the land has been established as a geothermal development site as a result of the test drilling which was conducted in 1976. Therefore, effects on agricultural production of the subject 4.1 acre site would be further mitigated. Should the proposed project prove to be successful, geothermal energy and its by-products could possibly have a positive impact on agricultural activities, and possibly even be able to service some urban-related needs. The geothermal water could be used for agricultural irrigation, and the by-products of the geothermal water could also be used for other agricultural

purposes. It is therefore determined that the granting of this particular request also would not be in conflict with the State and County's agricultural policies. In fact, it may even further foster agricultural development in the general area.

4. As a result of the 1974 oil crisis, there has been concern over Hawaii's dependence on imported petroleum. Prior to 1974, the Hawaii Geothermal Project (HGP), which is a cooperative project involving Federal, State, County and private funds, was organized to investigate the development of geothermal energy. The subject property was selected as a test site. In April 1976, a successful well was drilled and completed, and as a result, HGP has proposed the installation of a research power plant to demonstrate that geothermal energy is an economically viable natural energy alternative.

5. It has been the County and State's policy to encourage the development of alternative energy sources. Both levels of government, as well as the Federal Government, have provided substantial funding and services for energy resource research and development to reduce the State's dependence on imported fuels. The island of Hawaii is believed to possess a vast resource base of geothermal heat. The test drilling at this site demonstrated the existence of a valuable geothermal energy source. However, the extent and magnitude of geothermal resources in Hawaii must still be determined. There is no way of knowing if the island actually has a geothermal resource of economic importance unless further testing is conducted. As a potential power source, geothermal may either prove to be of major importance or no importance at all. Only by further testing can this uncertainty be resolved.

6. Although the proposed use may have some adverse effects, such as problems of noise and fumes, to the surrounding property and the residents in the immediate area, stringent controls and conditions are attached to this Special Permit in order that the concerns may be alleviated. The Petitioner will be required to comply with all applicable requirements of the State of Hawaii Department of Health.

7. The use described in the Petition is an unusual and reasonable use pursuant to HRS Chapter 205-6 and State Land Use Commission District Regulation, Part V.

DECISION AND ORDER

IT IS HEREBY ORDERED that Special Permit Number 78-307 for the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-1: portion of 2, be approved subject to the following conditions:

1. That the landowner, Kapoho Land Development Co., or its authorized representative shall submit a subdivision plan and receive tentative approval within one (1) year from the effective date of the Special Permit. The landowner/representative shall also be responsible for securing final subdivision approval.

2. That plans for Plan Approval be submitted within two (2) years from the effective date of approval of the Special Permit.

3. That construction of the proposed facility commence within one (1) year from the effective date of receipt of final Plan Approval and be completed within three (3) years thereafter.

4. That a landscaping buffer or screening zone be provided along the main highway fronting the subject property. The landscaping plans shall be submitted to the Planning Department for review and approval at the time of Plan Approval.

5. That the rules, regulations, and requirements of the State Department of Health shall be complied with.

6. That the Petitioner or its authorized representative shall be responsible in assuring that every precaution is taken to reduce any nuisances, whether it be noise or fumes, which may affect the residents and properties in the immediate area. Should it be determined by the Planning Director that these precautionary measures are not being applied, he will prepare and present a written report to the Planning Commission for its appropriate action which may involve the termination of the Special Permit.

7. That the requirements of the County Grading Ordinance shall be complied with.

8. That should any unanticipated archaeological or historical sites be found on the subject property, the Petitioner/representative shall immediately notify the Planning Department and cease operation until a clearance to recommence work is given by the Department.

9. That upon termination of the operation or if the Petitioner determined that the project is not feasible, all structures erected shall be dismantled and removed from the site.

10. That only a maximum of two (2) accesses shall be permitted from the main highway meeting with the approval of the Chief Engineer of the County Department of Public Works.

11. That all other applicable rules and regulations shall be complied with.

12. That failure to comply with any of the delineated conditions of approval, particularly those relating to time commencement and expiration, shall be reason for termination of the Special Permit. Also, requests for any time extension filed after the stipulated commencement or expiration dates shall not be approved.

DATED: Honolulu, Hawaii, February 7, 1979.

LAND USE COMMISSION

By C. W. Duke
C. W. DUKE
Chairman and Commissioner

By Shinichi Nakagawa
SHINICHI NAKAGAWA
Vice Chairman and Commissioner

By James R. Carras
JAMES R. CARRAS
Commissioner

By Shinsei Miyasato
SHINSEI MIYASATO
Commissioner

By Mitsuo Oura
MITSUO OURA
Commissioner

By George R. Pascua
GEORGE R. PASCUA
Commissioner

No.

974860

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO

SIDNEY FUKE

STREET AND NO.

25 Aupuni St.

P.O., STATE AND ZIP CODE

Hilo, Hawaii 96720

POSTAGE

\$ 1.32

CONSULT POSTMASTER FOR FEES

CERTIFIED FEE

.80¢

OPTIONAL SERVICES

SPECIAL DELIVERY

¢

RESTRICTED DELIVERY

¢

RETURN RECEIPT SERVICE

SHOW TO WHOM AND DATE
DELIVERED

.45 ¢

SHOW TO WHOM, DATE, AND
ADDRESS OF DELIVERY

¢

SHOW TO WHOM AND DATE
DELIVERED WITH RESTRICTED
DELIVERY

¢

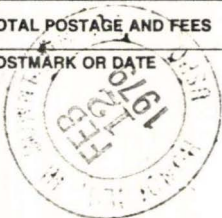
SHOW TO WHOM, DATE AND
ADDRESS OF DELIVERY WITH
RESTRICTED DELIVERY

¢

TOTAL POSTAGE AND FEES

\$ 2.57

POSTMARK OR DATE



- SENDER: Complete items 1, 2, and 3.
Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one).

- ☒ Show to whom and date delivered. ¢
☐ Show to whom, date, and address of delivery. ¢
☐ RESTRICTED DELIVERY
 Show to whom and date delivered. ¢
☐ RESTRICTED DELIVERY.
 Show to whom, date, and address of delivery. \$ ____
 (CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:

MR. SIDNEY FUCE

3. ARTICLE DESCRIPTION:

REGISTERED NO.

CERTIFIED NO.

INSURED NO.

974860

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE



Addressee



Authorized agent

DATE OF DELIVERY

2/13/79

POSTMARK

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S
INITIALS

307

No.**974861****RECEIPT FOR CERTIFIED MAIL****NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL****(See Reverse)****SENT TO****Dept. of Land & Nat. Res.****STREET AND NO.****1151 Punchbowl St.****P.O., STATE AND ZIP CODE****Honolulu, Hi. 96813****POSTAGE****\$.41****CERTIFIED FEE****.80 ¢****SPECIAL DELIVERY****¢****RESTRICTED DELIVERY****¢****RETURN RECEIPT SERVICE****SHOW TO WHOM AND DATE
DELIVERED****.45 ¢****SHOW TO WHOM, DATE, AND
ADDRESS OF DELIVERY****¢****SHOW TO WHOM AND DATE
DELIVERED WITH RESTRICTED
DELIVERY****¢****SHOW TO WHOM, DATE AND
ADDRESS OF DELIVERY WITH
RESTRICTED DELIVERY****¢****TOTAL POSTAGE AND FEES****\$ 1.66****POSTMARK OR DATE****SP78- 307 DPED****PS Form 3800, Apr. 1976**

**STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE,
CERTIFIED MAIL FEE, AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (see front)**

1. If you want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, **leaving the receipt attached**, and present the article at a post office service window or hand it to your rural carrier. (no extra charge)
2. If you do not want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, date, detach and retain the receipt, and mail the article.
3. If you want a return receipt, write the certified-mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.
4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse **RESTRICTED DELIVERY** on the front of the article.
5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in Item 1 of Form 3811.
6. Save this receipt and present it if you make inquiry.

- SENDER. Complete items 1, 2, and 3.
Add ~~7635~~ address in the "RETURN TO" space on reverse.

1. The following service is requested (check one).

- ☒ Show to whom and date delivered. ¢
☐ Show to whom, date, and address of delivery. ¢
☐ RESTRICTED DELIVERY
 Show to whom and date delivered. ¢
☐ RESTRICTED DELIVERY.
 Show to whom, date, and address of delivery. \$ ____
 (CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:

DEPT. OF LAND & NATURAL
RESOURCES

3. ARTICLE DESCRIPTION:

REGISTERED NO.

CERTIFIED NO.

INSURED NO.

974861

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE

☐ Addressee

☐ Authorized agent

4.

DATE OF DELIVERY
FEB 15 1979

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S
INITIALS



UNITED STATES POSTAL SERVICE
OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address, and ZIP Code in the space below.

- Complete items 1, 2, and 3 on the reverse.
- Attach to front of article if space permits. Otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300



**RETURN
TO**



State of Hawaii
LAND USE COMMISSION
Suite 1795, Pacific Trade Center
190 South King Street
Honolulu, Hawaii 96813

(Name of Sender)

(Street or P. O. Box)

(City, State, and ZIP Code)

BEFORE THE LAND USE COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Special) SP78-307
Permit of)
)
DEPARTMENT OF PLANNING AND)
ECONOMIC Development)
)
_____)

CERTIFICATE OF SERVICE

I hereby certify that a copy of the Land Use
Commission's Decision and Order was served upon the
following by certified mail or hand delivery:

Sidney Fuke, Planning Director
Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Hideto Kono, Director
Department of Planning and Economic
Development
State of Hawaii
250 South King Street
Honolulu, Hawaii 96813

Department of Land and Natural Resources
Division of Land Management
State Office Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dated: Honolulu, Hawaii, this 9th day of February, 1979.

for *Gordan Y. Furutani*
GORDAN Y. FURUTANI
Executive Officer
Land Use Commission

EAGLE-A
TYPE-ERASE
25% COTTON FIBER USA

July 21, 1978

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
State of Hawaii
250 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kono:

The original of the attached letter is on file
in the office of the Hawaii County Planning Department,
25 Aupuni Street, Hilo, Hawaii.

Please be advised that failure to comply with any
of the delineated conditions of approval, particularly
those relating to time, shall be reason for termination
of the Special Permit. The Land Use Commission will not
consider any request for time extension which is filed
after the stipulated commencement or expiration dates.

A copy of the staff memorandum is herewith enclosed
for your information. The Land Use Commission's Decision
and Order on SP78-307 will be forwarded to you at a later
date.

Sincerely,

GORDAN Y. FURUTANI
Executive Officer

GYF:jy
Encls.

July 21, 1978

Hawaii Planning Commission
25 Aupuni Street
Hilo, Hawaii 96720

Attention: Mr. Sidney Fuke, Planning Director

Gentlemen:

At its meeting on July 18, 1978, the Land Use Commission voted to approve a Special Permit request by the Department of Planning and Economic Development, Hawaii (SP78-307) to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-1: portion of 2.

Approval of this Special Permit is subject to the conditions imposed by the Hawaii County Planning Commission. Please be advised that the petitioner's failure to comply with any of the delineated conditions of approval, particularly those relating to time, shall be reason for termination of the Special Permit. The Land Use Commission will not consider any request for time extension which is filed after the stipulated commencement or expiration dates.

A copy of the staff memorandum is herewith enclosed for your information. The Land Use Commission's Decision and Order on SP78-307 will be forwarded to you at a later date.

Sincerely,

GORDAN Y. FURUTANI
Executive Officer

GYF:jy
Encl.

cc: Dept. of Planning & Economic Development

July 21, 1978

Dept. of Land & Natural Resources
Division of Land Management
State Office Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Gentlemen:

At its meeting on July 18, 1978, the Land Use Commission voted to approve a Special Permit request by the Department of Planning and Economic Development, Hawaii (SP78-307) to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-1: portion of 2. Approval of this Special Permit is subject to the conditions imposed by the Hawaii County Planning Commission.

Please note that a copy of the Land Use Commission's Decision and Order on this matter is on file at the Commission's office.

Sincerely,

GORDAN Y. FURUTANI
Executive Officer

GYF:jy
Encl.

cc: Department of Taxation, Hawaii
Tax Maps Recorder, Dept. of Taxation
Property Technical Office, Dept. of Taxation
Real Property Tax Assessor, Dept. of Taxation
Office of Environmental Quality Control

STATE OF HAWAII
LAND USE COMMISSION

Minutes of Meeting

Conference Room 322 (B & C)
New State Building
1151 Punchbowl Street
Honolulu, Hawaii

July 18, 1978 - 9:30 a.m.

Approved
SEP 27 1978

COMMISSIONERS PRESENT: Charles Duke, Chairman
Shinichi Nakagawa, Vice Chairman
James Carras
Shinsei Miyasato
Mitsuo Oura
George Pascua

COMMISSIONERS ABSENT: Colette Machado
Carol Whitesell
Edward Yanai

STAFF PRESENT: Gordan Furutani, Executive Officer
Daniel Yasui, Planner
Allan Kawada, Deputy Attorney General
Dora Horikawa, Chief Clerk

Ray Russell, Court Reporter

ACTION

A77-433 - ENCHANTED LAKE PARTNERS

In the matter of the boundary amendment petition by Enchanted Lake Partners, Docket A77-433, on which a hearing was held on February 27, 1978 by the Hearing Officer, a resume of his prepared report to the Commission was presented by Hearing Officer Benjamin Matsubara. It was Mr. Matsubara's conclusion that reclassification of the approximately 2.8 acres of land at Enchanted Lakes, Kailua, Oahu from Conservation to Urban was reasonable, non-violative of Section 205-2 of the Hawaii Revised Statutes, and consistent with the Interim State-wide Land Use Guidance Policy.

All of the parties to the petition submitted that they had no objections to the Hearing Officer's report.

Vice Chairman Nakagawa moved that the Hearing Officer's report be accepted and the petition to amend the land use

It was moved by Commissioner Pascua, seconded by Commissioner Carras and unanimously agreed to approve the Special Permit, subject to the conditions imposed by the Hawaii Planning Commission.

✓ sp78-307 - DEPARTMENT OF PLANNING & ECONOMIC DEVELOPMENT
TO ALLOW THE ESTABLISHMENT OF A GEOTHERMAL RESEARCH FACILITY
AND TO CONDUCT FLOW TESTS AT KAPOHO, PUNA, HAWAII

Mr. Yasui presented the staff report and identified the area under petition.

Commissioner Carras moved to approve the petitioner's request, subject to the conditions stipulated by the Hawaii Planning Commission. Commissioner Oura seconded the motion and it was unanimously passed.

SP78-303 - ARTHUR KUWAHARA, ET AL
TO ALLOW THE CONSTRUCTION OF A SECOND DWELLING UNIT AT KULA, MAUI

Mr. Yasui reported on the pertinent facts contained in the staff report and also oriented the parcel under petition with various surrounding landmarks.

Commissioner Miyasato moved to approve the application, which was seconded by Vice Chairman Nakagawa and unanimously passed.

SP78-304 - KAPALUA LAND COMPANY, LTD.
TO ALLOW THE DEVELOPMENT OF A GOLF COURSE AT KAPALUA, MAUI

A resume of the staff report was presented by Mr. Yasui. The area under petition was also identified and located on the maps.

Commissioner Miyasato moved and Vice Chairman Nakagawa seconded to approve the Special Permit, subject to the conditions imposed by the Maui Planning Commission. The motion was unanimously carried.

SP78-308 - AMERON HC&D MAUI
TO ALLOW THE ESTABLISHMENT OF A CONCRETE BATCHING PLANT AT
KIHEI, MAUI

Staff planner oriented the Commission to the area under petition with the aid of the maps, and read pertinent excerpts from the staff report.

It was moved by Commissioner Miyasato, seconded by Commissioner Oura, and unanimously agreed to approve the Special

STATE OF HAWAII
LAND USE COMMISSION

VOTE RECORD

ITEM SP78-307
Dept. of Plan. & Econ. Dev. DATE July 18, 1978
 Conf. Rm. 322 (B&C)
PLACE New State Bldg. TIME 9:30 a.m.
 Honolulu, Hawaii

	NAME	YES	NO	ABSTAIN	ABSENT
	MACHADO, COLETTE				X
	WHITESELL, CAROL				X
	PASCUA, GEORGE R.	X			
	MIYASATO, SHINSEI	X			
M	CARRAS, JAMES	X			
	NAKAGAWA, SHINICHI	X			
S	OURA, MITSUO	X			
	YANAI, EDWARD.				X
	DUKE, CHARLES	X			

Comments: I move that we approve the Special Permit, subject to the conditions imposed by the Hawaii County Planning Commission.

STATE OF HAWAII
LAND USE COMMISSION

MEMORANDUM

TO: Land Use Commission DATE: July 18, 1978
FROM: Staff
SUBJECT: SP78-307 - Department of Planning and Economic
Development

The petitioner, the Department of Planning and Economic Development, is requesting a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-1: portion of 2. The subject property is located along the eastside of Pohoiki Road, about one (1) mile makai of Lava Tree State Park (see attached County Exhibits ZZ-1, NN-1, NN-2, and A-6).

The subject 4.1 acre area is a portion of a larger 353 acre parcel which is owned by the Kapoho Land and Development Company. The Department of Planning and Economic Development has received authorization from the landowner to submit the Special Permit application.

More specifically, the subject request is to allow the following:

1. Flow tests which are intended to provide more information about the characteristics of the geothermal well identified as HGP-A and the Kapoho geothermal reservoir;
2. Installation of a geothermal research facility, identified as the Hawaii Geothermal Research Station, which would include: a) a power generation system and associated equipment and b) a research facility to test electric and non-electric applications of geothermal resources;
3. Use of the power plant and research facility, including the sale of electricity generated; and

4. A visitor information center facility.

It is estimated that design of the proposed system will take approximately one year and that construction of the system and facility will take another year. DPED is the lead agency for the HGP-A Development Group which is made up of representatives of the State, the County of Hawaii, the University of Hawaii and the Hawaii Electric Light Company. It is anticipated that the proposed project will be funded with 80 to 90 percent Federal funds, a State contribution of \$400,000 and \$100,000 in County funds.

The components of the proposed facility can be grouped into four distinguishable functions. These are described as follows:

1. An administration and maintenance area which would include an office structure; a laboratory structure; a maintenance building; a maintenance, storage and fabrication yard; and parking.
2. A research and development (R&D) test facility consisting of up to three test pads. The test pads would have concrete floors and be approximately 35 feet by 35 feet in area. They would have roofs over them.
3. Equipment and facilities related to the extraction of geothermal fluids and their conversion to a usable form for the proposed power plant as well as a return system. These would include major improvements such as silencers; a drain field into which geothermal fluids are presently discharged; a steam-water separator; an iron catalyst system to abate hydrogen sulfide (H_2S) and its odor by turning it into sulfur and which also includes a clarifier, a sludge dryer, compactor and container fill. Also proposed are a possible injection well and pump; an extensive piping system; and cooling towers. The proposed cooling towers would either be 60.5 feet by 29 feet and 18 feet in height or 36-foot square units with 53-foot heights.
4. The power plant which includes a demister; a turbine; a generator, a condensor system; two switchgears; a transformer; load banks for excess power generated which cannot be transmitted; lightning arrestors; and a control trailer and motor control center, each of which would be a

transportable 8' x 8' x 24' building module.

In support of the request, the petitioner has in part stated the following:

"The Hawaii Geothermal Research Station will consist of the research power plant and a facility to do research and development of electric and non-electric applications of geothermal resources.

"The research power plant will assist the development of geothermal energy in the State...through the early demonstration of the general of electricity from geothermal heat from a young volcanic geothermal reservoir. The project will assist the industrial sector in evaluating and establishing the operational risk levels associated with energy production from such a source, and help to determine the environmental constraints that may be associated with the long-term production of fluids from a typical volcanic geothermal reservoir.

"The R&D test facility will consist of up to three test pads and pipes to supply the geothermal fluids to the test pads. The R&D of electric applications will include tests of concepts, hardware components, and subsystems. A wide range of non-electric applications will be tested including agricultural applications, such as controlled-environment cultivation; industrial food-processing, such as canning, freeze-drying and processing fruit and fruit-juices; and aquaculture applications, such as raising nehu.

"The Special Use Permit is requested because, even though the project is an unusual use of agriculturally classified land, it is a reasonable use that will have a minimal effect on the surrounding lands..., and, most importantly, the permit is requested because a successful demonstration of geothermal resources for energy and other applications will hasten the overall development of geothermal energy in the Puna District, which will be of great benefit to the County of Hawaii, and, more generally, to the State of Hawaii and all of its people.

"The rapid development of geothermal energy in Puna requires a positive confirmation that the Kapoho Reservoir tapped by HGP-A has an energy potential of the magnitude that has been attributed to it by scientists at the Hawaii Institute of Geophysics (500 MW for 100 years). Therefore a further assessment of the reservoir is needed, and the Hawaii Geothermal Project anticipates conducting a reservoir assessment project, under a separate Federal grant for this purpose. Thus while the reservoir assessment is needed prior to development of the field, and

will be conducted in cooperation with the Hawaii Geothermal Research Station project--the subject of this Special Use Permit--it will be a separate project and apply for any permits required separately. The reservoir assessment project will require one or two step-out wells to HGP-A. A step-out well is a well drilled in relation to another well (usually within a 2,000 ft. circumference) so that tests on one well will contribute data on the other well and the reservoir that they both tap into.

"Selection of the turbine generator and associated equipment suitable for the particular composition of geothermal fluids from HGP-A will require further well testing. It is, therefore, anticipated that short- and long-term flow tests will be conducted prior to and during the construction of the wellhead generator system. During different phases of the project, the following flow tests can be anticipated:

- "(a) Period from the award of permit to the initiation of construction phase.

A series of short-term flow tests will be necessary to collect and confirm information for the design of the wellhead turbine generator. The information required includes fluid chemistry, composition of non-condensable gases, fluid heat content, orifice plate size limits, control valve specifications, corrosion samples, reservoir production layers, etc.

The flow tests will be limited to no more than 8 hours per 24-hour period, and will usually be for fewer than 8 hours. They will be conducted between 7 a.m. and 7 p.m. when few persons living in the surrounding area are at home. The tests will be conducted with the existing silencing equipment. A maximum of 20 such tests are anticipated, and as few as half that number may be required.

- "(b) Period during the construction (a nine-month construction period is anticipated).

A series of equipment shakedown tests will be conducted during the construction of various components of the wellhead turbine generator system. The tests will be limited to no more than 8 hours per 24-hour period prior to the installation of more effective equipment to control noise and odor. They will be further limited to between 7 a.m. and 7 p.m. If, however, the odor and noise control systems are installed (they could be in place

within a year and a half of the project start date), the flow tests may be continuous for as long as the shakedown tests require.

- "(c) Period after effective noise and odor control systems are installed, but prior to the completion of the total turbine generator system.

Long-term flow tests may be initiated to evaluate the Kapoho geothermal anomaly and to conduct interference tests when other wells adjacent to the HGP-A are completed. The flow tests will be continuous on a 24-hour per day basis for as long as needed.

"The successful generation of electricity with geothermal energy from HGP-A will help to persuade the utility to consider using this energy resource for the growing energy needs of the Big Island, instead of constructing additional oil-fueled generating plants. As previously stated, the target date for completion of the power plant is two years after the project's start date.

"It is estimated that HGP-A can produce up to 3.5 megawatts of electricity, of which HELCO has agreed to purchase 1.5 to 3 megawatts. The remaining electricity will be used for experimental purposes in the Station's R&D facility or dissipated in the resistive load banks.

"It is the intention of the HGP-A Development Group to sell the electricity to the utility, but this use requested for the property is nevertheless for research rather than commercial purposes because the objective is to gain experience with the engineering and financial factors involved in producing electricity from a young volcanic reservoir.

"HELCO has stated that they will pay for electricity generated from geothermal steam from HGP-A at a rate to HELCO's average cost of energy per net kilowatt hour generated and purchased, or, in other words, approximately \$200,000 to \$260,000 per year for 1.5 to 3 megawatts of electricity. HELCO estimates that operating expenses (labor and supplies) for the power plant will be about \$150,000.

"The current expectation is that the R&D facility for experimenting with electric and non-electric applications of geothermal resources will be built largely with State funds, although some Federal funds may be available for the facility and the research projects conducted there.

"When the Hawaii Geothermal Research Station (the power plant and the R&D facility) is in place, there will be no adverse effect on surrounding properties because the power plant will muffle the noise that is currently experienced when steam is released from the well and the H₂S abatement equipment will almost totally eliminate H₂S from being released into the atmosphere. Thus when the facility is completed, the noise and hydrogen sulfide problems will be mitigated, and the major nuisance effect will be visual. It will be possible to see the Station's cooling towers from Pohoiki Road. The cooling towers will be 25-30 feet from the road and could be as high as 53 feet... A redwood fence will surround the Station, and it too will be visible from the road. Because of the size of the cooling towers, they will prevent the Station's other facilities from being seen from the road. The towers will be painted to blend in as much as possible with the landscape, and plants and foliage will be used to make the area more visually attractive.

"The flow tests that are proposed prior to the installation of noise and odor control systems will, admittedly, result in increased noise and sulfur levels in the surrounding area. But the tests will be run as previously described for only short periods during the day to minimize the nuisance effect. Only a dozen families presently live within the mile radius of the well, and this type of well-testing has not caused them undue hardship in tests conducted to date. Once the turbine generator and scrubber are in place, the noise will be muffled, and the hydrogen sulfide (H₂S) scrubbed from the geothermal fluids, so that the impact on the surrounding properties will be minimal."

The County of Hawaii's General Plan Land Use Pattern Allocation Guide Map designates the subject area as Orchards. Present County Zoning is Agricultural 1-acre (A-1a).

The subject area is largely covered by 'a'a lava from the 1955 flow. The Land Study Bureau's overall master productivity soil rating for agricultural use is Class "E" or "Very Poor" for the subject site. The U.S.D.A. Soil Conservation Service's capability rating is Class VIII for the soils of the property.

Access to the subject area is directly off of Pohoiki Road. Surrounding land uses include scattered residences, diversified agriculture such as papaya and foliage, and vacant lands. Leilani Estates subdivision is approximately 1,000 feet south of the subject area at the subdivision's closest boundary. Lanipuna Gardens is a little less than 1,000 feet from the area under consideration in an easterly direction. The closest dwelling is approximately 2,500 feet west of the subject area (TMK: 1-4-01: 20).

An environmental impact statement has been prepared and submitted as part of the permit application. This document was formally accepted by Governor Ariyoshi on April 12, 1978.

Pertinent comments from governmental agencies:

1. Department of Agriculture

"The Department of Agriculture supports approval of this Special Permit Application. As the exhibits to the application clearly indicate, the potential benefits of this project to agriculture greatly outweigh the potential costs which would involve the loss of small amounts of agricultural land."

2. Department of Health

"Our comments are made in a supportive manner. Background data reports odor (H₂S) and noise complaints made by Leilani and Nanawale Estate residents. Air droplets contaminating their rain catchment drinking waters were suspected by the residents and our studies found no concerns. The current submittals project for noise silencers and the scrubbing of the H₂S odor. Recommend the nearby residents be informed through public meetings of your future plans and precautions."

3. Fire Department

"There is no 24-hour fire protection service available at the site, should this application be approved to install a wellhead generator at the HGP-A test well site. The nearest fire station is located at Keaau."

4. Department of Research and Development

"Thank you for this opportunity to review and comment on the above mentioned subject. We offer the following comments for your consideration.

- "a. The test facility as proposed is to demonstrate the practical feasibility of utilizing geothermal energy for electricity generation and direct use of this resource.
- "b. The County of Hawaii, through the participation of the Managing Director and the Director of the Department of Research and

Development has been active in the planning of this project.

- "c. This research program is part of an overall energy development (alternate energy source) program scheduled for the Big Island in its quest to attain self-sufficiency in energy.
- "d. The socio-economic impact of this study, and hopefully, its subsequent development as a viable alternate energy source, can be a boon to our economy.
- "e. As noted in the environmental impact statement by Robert Kamins (September 1977), the environmental impact appears to be minimal."

Other cooperating agencies including the Department of Water Supply, Police Department, Department of Transportation, Department of Public Works, and Hawaii Electric Light Company, Inc. had no objections to the Special Permit.

At the public hearing held by the Hawaii Planning Commission on February 23, 1978, several representatives of the petitioner, including technical resource personnel were on hand to answer questions and to testify in support of the request. Also testifying in support of the request was Mr. Jack Keppler, Managing Director for the County of Hawaii. Much of the discussion at the hearing concerned technical and operational aspects of the proposed geothermal facility. No other persons testified on the permit request. The Planning Commission moved to continue the public hearing until the project's final Environmental Impact Statement had been approved.

Approval of the final Environmental Impact Statement was attained on April 12, 1978. The Planning Commission subsequently continued the public hearing on April 27, 1978. At that time, three (3) representatives of the petitioner were again present to answer any questions concerning the Special Permit.

Under public testimony, Mr. James Stilts, Chairman of Leilani Community Association on Geothermal development, questioned the effects and benefits they would derive from this geothermal project. He pointed out that if the wind is blowing just right, they are able to smell the sulphur. Dr. Bill Chen of the geothermal research project, pointed out that the project is committed to reduce the noise and smell level as much as present technology is able to. Dr. Chen pointed out that this research demonstration is to find out whether it is worth the environmental

degradation and also to determine other non-electric uses that could be maintained.

Also under public testimony, Mr. James Kahaloa, on behalf of the Puna Hui Ohana, recommended that the Special Permit be denied. He pointed out that the Puna Hui Ohana felt that the environmental impact statement failed to properly recognize and take into consideration the impact of the proposed project on the aboriginal rights of the native Hawaiian people. In response, the Commission Chairman pointed out that the Planning Commission was not in a position to make any kind of ruling on aboriginal rights.

Mr. Stephen Kane-a-I Morse, Director of the Native Hawaiian Legal Corporation, spoke against approval of the Special Permit request and said that the energy which the project proposes to tap and sell is a physical manifestation of the Hawaiian religion. He said he felt it would be a mistake to allow this Special Permit to go through as there were very serious questions unanswered concerning the impact it has on the aboriginal Hawaiian people and their culture. Mr. Genesis Namakaokalani Lee Loy also echoed the sentiments and thoughts of Mr. Kahaloa and Mr. Morse.

Under public testimony, Mr. Alika Cooper requested the matter be deferred until the Hawaiian aboriginal rights, the Hawaiian Gods, and the Hawaiian culture, are considered. In response to Mr. Cooper's comments that Hawaiians are not represented in State or County Governments and boards and commissions, Commissioner Paris pointed out that the Planning Commission is represented by a Hawaiian as he himself is of Hawaiian blood.

For the Commission's information, the hearing transcripts of February 23 and April 27, 1978 have been attached (County Exhibits HH and UU).

On June 1, 1978, the Planning Commission voted to recommend approval of the Special Permit to the Land Use Commission based on the following findings:

- "1. The proposed use will not be contrary to the objectives to be accomplished by the State Land Use Law and Regulations. The Land Use Law and Regulations are intended to preserve, protect, and encourage the development of lands in the State for those uses to which these lands are best suited in the interest of public health and welfare of the people.

"The Agricultural District category, within which the subject area is situated, includes those lands with a high capacity or potential for agricultural uses. It also includes lands surrounded by or contiguous to agricultural lands and which are not suited to agricultural and ancillary activities by reason of topography, soils and other related characteristics. The subject area is largely covered by 'a'a lava from the 1955 flow, and is classified as Class VIII by the USDA Soil Conservation Service. This class of soils is the lowest in the Soil Conservation Service's rating system. The Land Study Bureau's Overall Capability Rating for these soils is Class 'E' or 'Very Poor'. Although it is possible for some form of agricultural activity to be conducted on these soils, as evidenced by the surrounding agricultural uses, it is determined that the use of this parcel for the proposed activities will not adversely affect the agricultural potential of the region, the island, and the State.

"Further, the proposed use will not substantially alter or change the essential character of the land and its present use since the land has been established as a geothermal development site as a result of the test drilling which was conducted in 1976. Therefore, effects on agricultural production of the subject 4+ - acre site would be further mitigated. Should the proposed project prove to be successful, geothermal energy and its by-products could possibly have a positive impact on agricultural activities, and possibly even be able to service some urban-related needs. The geothermal water could be used for agricultural irrigation, and the by-products of the geothermal water could also be used for other agricultural purposes. It is therefore determined that the granting of this particular request also would not be in conflict with the State and County's agricultural policies. In fact, it may even further foster agricultural development in the general area.

- "2. That unusual conditions, trends, and needs have arisen since the district boundaries and regulation were established.

"Electricity is the major form of energy utilized in Hawaii. Most of the electricity is obtained through

the burning of imported oil. Nationally, for the remainder of the 20th Century, most of the energy demand will be met with fossil fuels and nuclear fission. In turn, fossil fuels are fast becoming a scarce world commodity due to increasing demand. Hawaii is currently most vulnerable to dislocations in the global oil market, but is also endowed with a variety of natural energy resource alternatives which are renewable or inexhaustible and potentially low polluting. Hawaii's near total dependence on imported petroleum provides the incentive for the promotion of energy conservation and the development of technology to harness local natural energy resources, such as geothermal. Therefore, the primary goal of the County of Hawaii relative to energy is 'Energy self-sufficiency'. It is felt that we must strive to attain energy self-sufficiency in order to minimize the dependence on imported fossil fuels. A commitment must be made by both the government and the public for research, planning, and development to attain the goal of energy self-sufficiency. In doing so, the County as well as the entire State would be benefited.

"As a result of the 1974 oil crisis, there has been concern over Hawaii's dependence on imported petroleum. Recognizing this concern, the Hawaii County General Plan has stated as a policy that the 'County shall encourage the continuation of studies concerning the development of power which can be distributed at lower costs to consumers'. Further, the State Legislature has since then enacted several significant bills which were designed to promote the research and development of natural energy resources, and the conservation of energy in order to foster a greater independence from imported fossil fuels. However, prior to 1974, the Hawaii Geothermal Project (HGP), which is a cooperative project involving Federal, State, County and private funds, was organized to investigate the development of geothermal energy. The subject property was selected as a test site. In April 1976, a successful well was drilled and completed, and as a result, HGP has proposed the installation of a research power plant to demonstrate that geothermal energy is an economically viable natural energy alternative.

"The nation is embarking on an aggressive program to develop its indigenous resources of geothermal energy. For over a decade, geothermal energy has been proclaimed as one of the more promising forms of alternate energy supply. It has been the County and State's policy to encourage the development of alternative energy power. Both levels of government, as well as the Federal Government, have provided substantial funding and services for energy resource research and development to reduce the State's dependence on imported fuels. The island of Hawaii is believed to possess a vast resource base of geothermal heat. The test drilling at this site demonstrated the existence of a valuable geothermal energy source. However, the extent and magnitude of geothermal resources in Hawaii must still be determined. There is no way of knowing if the island actually has a geothermal resource of economic importance unless further testing is conducted. As a potential power source, geothermal may either prove to be of major importance or no importance at all. Only by further testing can this uncertainty be resolved. It is from these exploratory projects that data for evaluating the suitability of the resources as a production reservoir are obtained. Therefore, by allowing the proposed use, we would also be in the direction of fulfilling the County's goal of encouraging and supporting the expansion of the research and development industry. The development of geothermal power could bring the County closer to becoming a scientific model as articulated under the Economic Element of the General Plan.

"Geothermal energy source could have tremendous benefits for people of this County as well as the rest of the State. Aside from providing power, the successfulness of the geothermal project can also be a major factor in accomplishing several other goals. A reduction in the County's current high cost of energy could aid existing industries as well as possibly attract new endeavors. Should the project prove successful, it can open the doors for economic development of a nature and magnitude beyond the realm of reality a few years ago. The success of geothermal energy could possibly stimulate economic activity which would provide new employment opportunities for the residents of the County. New industries, such as the mining and

processing of manganese nodules, will be attracted into the area in the event that large amounts of power become available. These industries would provide job opportunities for construction, operation and other essential services. Thus, if the source of geothermal energy is successful and properly developed, it will be of great importance and benefit to the future of Hawaii.

"By allowing the proposed use, we will be in the direction of fulfilling the goals of the General Plan's Public Utilities element of 'ensuring that adequate, efficient and dependable public utility service will be available to users', and 'maximizing efficiency and economy in the provision of public utility services'.

"It is therefore felt that the granting of the subject request at its particular location would be in the direction of fulfilling the County's General Plan's goals and policies, as well as that of the State Land Use Law and Regulations relative to providing for the public's welfare.

- "3. Although it has been pointed out that the proposed use of the land for its intended purpose may have some adverse effects, such as problems of noise and fumes, to the surrounding property and the residents in the immediate area, stringent controls and conditions will be attached to this Special Permit in order that the concerns may be alleviated. The petitioner will be required to comply with all applicable requirements of the State of Hawaii Department of Health.

"Finally, we are cognizant of the fact, that the granting of this particular Special Permit may lead to similar types of requests. As such, it should be pointed out that we are working on a policy of such exploratory programs to minimize rampant development of test sites. The qualification of our favorable recommendation to allow the petitioner to proceed with this development is that the total project shall be closely monitored and the petitioner will be held accountable to stringent standards to insure minimal damage to our environment. We are cognizant of the possible dangers to health of

residents in the area, and as stated earlier, will require preventative measures as conditions of approval of the Special Permit.

"At this time, it should be pointed out that as part of the County's General Plan Update Program, the Planning Department has drafted a new Energy element for inclusion in the General Plan document. Certain goals and policies relative to the development of Geothermal and other energy resources are being proposed."

For the Commission's information, the meeting minutes of June 1, 1978 have been attached (County Exhibit FFF).

The favorable recommendation was subject to the following conditions:

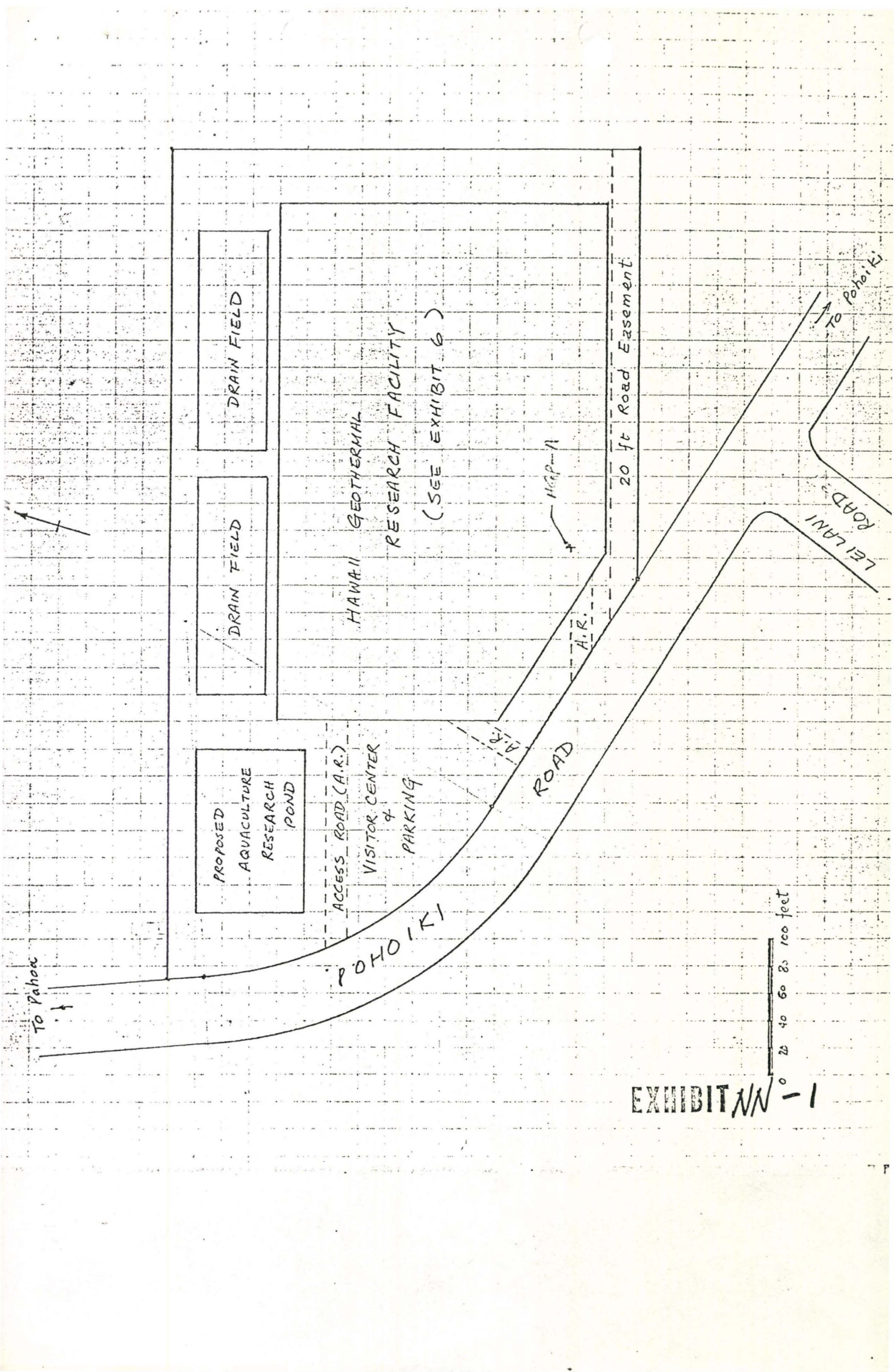
- "1. That the landowner, Kapoho Land Development Co., or its authorized representative shall submit a subdivision plan and receive tentative approval within one (1) year from the effective date of the Special Permit. The landowner/representative shall also be responsible for securing final subdivision approval.
- "2. That plans for Plan Approval be submitted within two (2) years from the effective date of approval of the Special Permit.
- "3. That construction of the proposed facility commence within one (1) year from the effective date of receipt of final Plan Approval and be completed within three (3) years thereafter.
- "4. That a landscaping buffer or screening zone be provided along the main highway fronting the subject property. The landscaping plans shall be submitted to the Planning Department for review and approval at the time of Plan Approval.
- "5. That the rules, regulations, and requirements of the State Department of Health shall be complied with.
- "6. That the petitioner or its authorized representative shall be responsible in assuring that every precaution is taken to reduce any nuisances, whether it be noise or fumes, which may affect the residents and properties in the immediate area.

Should it be determined by the Planning Director that these precautionary measures are not being applied, he will prepare and present a written report to the Planning Commission for its appropriate action which may involve the termination of the Special Permit.

- "7. That the requirements of the County Grading Ordinance shall be complied with.
- "8. That should any unanticipated archaeological or historical sites be found on the subject property, the petitioner/representative shall immediately notify the Planning Department and cease operation until a clearance to recommence work is given by the Department.
- "9. That upon termination of the operation or if the petitioner determined that the project is not feasible, all structures erected shall be dismantled and removed from the site.
- "10. That only a maximum of two (2) accesses shall be permitted from the main highway meeting with the approval of the Chief Engineer of the County Department of Public Works.
- "11. That all other applicable rules and regulations shall be complied with."

It was further stated by the Planning Commission that:

"Failure to comply with any of the delineated conditions of approval, particularly those relating to time commencement and expiration, shall be reason for termination of the Special Permit. Also, requests for any time extension filed after the stipulated commencement or expiration dates shall not be approved."



To Pahoa

PROPOSED
AQUACULTURE
RESEARCH
POND

DRAIN FIELD

DRAIN FIELD

POHOIKI

ACCESS ROAD (A.R.)
VISITOR CENTER
&
PARKING

HAWAII GEOTHERMAL
RESEARCH FACILITY
(SEE EXHIBIT 6)

ROAD

20 ft Road Easement

0 20 40 60 80 100 feet

EXHIBIT *NN* - 1

LEI LANI
ROAD

To Pohoi

Proposed Use:

Approximate Area (Ac)

1. Hawaii Geothermal Research Facility	1.98
2. 20' Road Easement	.15
3. Access Roads	.10
4. Visitor Center and Parking	.30
5. Drain Fields	.38
6. Aquaculture Ponds	.28
7. Unused Space for landscaping + Setbacks	.91
Total	4.10

EXHIBIT N/N -2

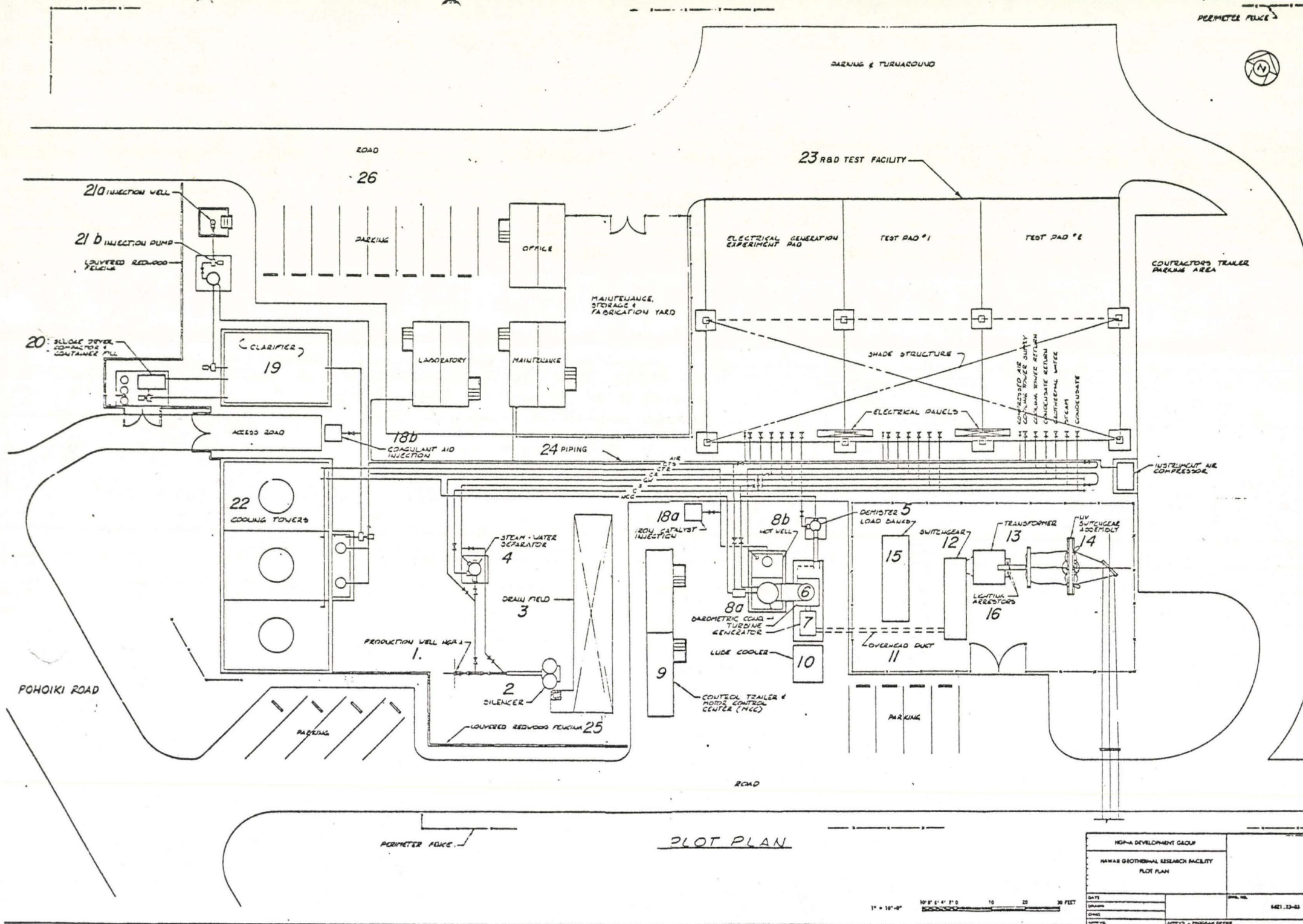


EXHIBIT A-6

Figure 3-42. Hawaii Geothermal Res.
Facility Plot Plan

Facilities Proposed for Hawaii Geothermal Research Station

1. Production Well HGP-A
2. Silencer
3. Drain Field
4. Steam-Water Separator
5. Demister
6. Turbine
7. Generator
- 8.a. Barometric condenser
- 8.b. Hot Well
9. Control Trailer and Motor Control Center (MCC)
10. Lube Cooler
11. Overhead Duct
12. Switchgear
13. Transformer
14. HV Switchgear Assembly
15. Load Banks
16. Lightning Arrestors
17. Instrument Air Compressor
- 18.a. Iron Catalyst Injection
- 18.b. Coagulant Aid Injection
19. Clarifier
20. Sludge Dryer, Compactor and Container Fill
- 21.a. Injection Well
- 21.b. Injection Pump
22. Cooling Towers
23. R&D Test Facility
24. Site Piping
25. Redwood Fencing
26. Roads, Parking and Security

Description of the Facilities Proposed for the
Hawaii Geothermal Research Station

The Hawaii Geothermal Research Station will consist of the research power plant and a facility to do research and development of electric and non-electric applications of geothermal resources.

The research power plant will assist the development of geothermal energy in the State of Hawaii through the early demonstration of the generation of electricity from geothermal heat from a young volcanic geothermal reservoir. The project will assist the industrial sector in evaluating and establishing the operational risk levels associated with energy production from such a source, and help to determine the environmental constraints that may be associated with the long-term production of fluids from a typical volcanic geothermal reservoir.

The R&D test facility will consist of up to three test pads and pipes to supply the geothermal fluids to the test pads. The R&D of electric applications will include tests of concepts, hardware components, and sub-systems. A wide range of non-electric applications will be tested including agricultural applications, such as controlled-environment cultivation; industrial food-processing, such as canning, freeze-drying and processing fruit and fruit-juices; and aquaculture applications, such as raising nehu.

General Description

The 4-acre site divides naturally into an upper and lower portion of roughly two acres each. There is presently a plastic-lined water pond on the upper 2-acre portion, which was used to supply water during the drilling of HGP-A.

The general grade of the property appears to fall to the southwest and appears to be very porous and no drainage problems appear imminent. There are two ways that used fluid from the research station could be disposed of, namely, through a drainage pond or through a reinjection well. During the design phase of the project, both methods will be studied and a decision will be made. If a drainage pond is used, it will probably be excavated on the upper portion of the site, which will remain essentially undeveloped.

The facilities indicated in the attached plot plan (Figure 3-42) are located in an area approximately 200 feet by 400 feet running in a northeast direction from the Pohoiki Road, and completely surrounded by a security type chain-link fence. The redwood slatted cooling tower has been placed between the road and all of the equipment to present an esthetically pleasing appearance and to keep the tower downwind of the plant components to prevent water carry-over to the plant. The power plant, consisting of the turbo-generator, demister and barometric condenser, has been located close to the production well and steam separator to keep the insulated, large-size piping lengths as short as possible because of their high cost. Any objectionable noise from the existing silencer in the present location should be muffled from the populated areas by the cooling tower. The switch gear and transformer area is adjacent to the turbo-generator to reduce wire lengths and to take advantage of the adjacent location of the HELCO grid.

Description and Use of Proposed Facilities

It should be noted that the generator and associated equipment have yet to be selected, and there may be minor variations in the plot plan of the research station when the major items of equipment have been selected and the

design phase has been completed. It is anticipated that the design phase will be completed 12 months after the project's start date. Thus the facilities on the attached plot plan, that are described below, are those that are anticipated for the research station and they closely resemble the equipment that will eventually be installed, but some changes or modifications are probable.

1. Production Well HGP-A

HGP-A is the well drilled to 6,435 feet by the Hawaii Geothermal Project. The fluids from HGP-A will be used to run the turbo-generator system to produce electricity. HGP-A has tested out with temperatures in excess of 600 degrees Fahrenheit downhole, and a wellhead pressure between 50 and 350 p.s.i. This pressure is sufficient to power an electric generating unit of up to 3.5 megawatts. No more than two megawatts of electricity will be sold to Hawaii Electric Light Co., however, because the transmission line that runs by the HGP-A site cannot handle more than two additional megawatts of power.

Any electric power generated at the station in excess of two megawatts will either be utilized to experiment with electric applications in the R&D test facility or be dissipated in the station's resistive load banks. Valves, gauges, accessories and mounting equipment will be installed on the wellhead to control and monitor fluid flow.

2. Silencer

A silencer will muffle the noise that accompanies the release of geothermal fluids to the atmosphere to prevent a nuisance to the persons living in the vicinity and to protect the personnel working in the area.

3. Drain Field

The drain field is the existing pit into which geothermal fluids from the well are presently discharged. If a reinjection well is drilled or a new enlarged drainage pond is developed, this drain field will no longer be needed.

4. Steam-Water Separator

The function of the steam-water separator is to receive the two-phase fluid as it comes out of the wellhead and separate it into steam and water. The two-phase fluid enters the separator through a tangential inlet duct and by centrifugal action the water is separated at the walls and settles to the bottom of the vessel while the steam rises over a central pipe that serves to exhaust the steam. The liquid phase is exhausted from the vessel and sent to the drainage pond. This piece of equipment will be 25-30 feet high.

5. Demister

A demister is a cylindrical tank with an internal arrangement which promotes a centrifugal separation of particles. The function of the demister is to remove entrained water droplets from the steam, before it enters the turbine. Steam coming from the steam/water separator contains minute quantities of water and dissolved solids. If these droplets are permitted to enter the turbine they will cause erosion and corrosion problems that will reduce the life of the blades and cause shutdowns and costly maintenance problems. The demister will reduce the moisture content of the steam to a level that can be tolerated by the turbine for long-term operation.

6. Turbine

A condensing turbine will be used in which the steam expands in several stages and supplies shaft power to an electric generator. The turbine will be a 20 to 25-foot high structure.

7. Generator

The generator transforms the mechanical energy from the turbine into electrical energy.

8.a. Barometric condenser and 8.b. Hot Well

The function of the condenser subsystem is to condense the vapor exhausting from a turbine and reduce the back pressure on the last stage. To accomplish this it is necessary not only to condense the water vapor but also to remove the non-condensable gases that accompany geothermal steam. The condenser subsystem therefore consists of a condenser, steam eductors to remove non-condensables, and water supply and pumps.

9. Control Trailer and Motor Control Center (MCC)

These are two transportable 8'x8'x24' building modules adjacent to the turbo-generator which house the motor control center and office for the power plant. This building has been isolated from the other support buildings because of the separate function and operation of the power plant.

10. Lube Cooler

This piece of equipment cools off the lubricants for machine bearings.

11. Overhead Duct

The function of the overhead duct is to house the insulated conductors which serve as a feeder from the generator to the substation. The feeders from the substation to the station service transformers will be conductors routed in a similar fashion.

12. Switchgear

The generator and low voltage switchgear protects and separates the generator from the transformer. It also supplies the plant with all the low voltage power needed.

13. Transformer

The transformer steps up the low voltage power from the generator to HELCO transmission voltage.

14. HV Switchgear Assembly

The high voltage switchgear assembly protects and separates the transformer from the HELCO system.

15. Load Banks

These load banks will dissipate any excess power generated from the generator system which cannot be transmitted.

16. Lightning Arrestors

These prevent lightning from damaging the facilities and equipment on the power plant site.

17. Instrument Air Compressor

The air compressor system provides compressed air as needed for instrumentation.

18.a. Iron Catalyst Injection and 18.b Coagulant Aid Injection

The iron catalyst system is an H_2S abatement system which includes the catalyst injection system, the clarifier, transfer pumps, the flocculator/clarifier, and the sludge handling system. The catalyst injection system injects ferric ions (via ferric sulfate) into the cooling water in the cooling towers. The ferric ions react with the dissolved H_2S to yield elemental sulfur, water and ferrous ions. As the cooling water is aerated in the cooling tower, the ferrous ions react with oxygen to reform ferric ions thus providing continuous regeneration of ferric ions to sustain the H_2S reactions which repeat continuously to yield sulfur. The sulfur thus formed is removed from the system via clarifiers (after flocculation) as a sludge and disposed of in accordance

with County regulations. A maximum of 1000 lbs. per day of sulfur will be produced.

19. Clarifier

The clarifier is a partially buried, pre-assembled steel tank in close proximity to the injection pumps and well, and also close to the clarifier sludge handling system located on the access road for easy removal of the sludge.

20. Sludge Dryer, Compactor and Container Fill

See "Iron Catalyst Injection" above.

21.a. Injection Well and 21.b. Injection Pump (Not in current planning)

The injection well and injection pump are used to reinject all geothermal fluids extracted from the resource less those used for research and demonstration applications or evaporated in the cooling tower.

22. Cooling Towers

The function of the cooling tower is to provide the water required to condense the vapor that is exhausted from the turbine, and the vapor that enters the interstage condensers of multiple stage gas ejectors. This is accomplished by cooling the water, including the condensate, from the condensation temperature (115°F) to the condenser feed water temperature (85°F). The cooling is done by the evaporation of water which occurs when air is passed through a curtain of falling condensate/cooling water. Cooling towers will be the most visible pieces of equipment at the research station because of their relatively large size.

The cooling tower depicted in the plot plan is composed of three modules, each of which is 60.5 by 29 feet, 18 feet high, and sits in a concrete basin 1.5 feet deep. Another type of cooling tower that could be utilized is a 36-foot square unit within a total height of 53 feet.

The water which will be used for the initial fill of the cooling tower system and used for the make-up of the cooling tower will be water that is produced by the existing production well in the form of condensation from the separator and from the turbine generator. Because the geothermal water analysis indicates that the water has a relatively low concentration of salts or other impurities (other than the H_2S), the geothermal water will be more than satisfactory for the cooling systems and any search for additional or alternate sources of cooling water is not necessary.

23. R&D Test Facility

The research test facility will be designed to accommodate experiments in electric and non-electric applications in support of local, State, and national needs to develop and utilize geothermal energy. The test facility will consist of up to three test pads, one of which will be designed specifically to test energy conversion systems. The test pads will have concrete floors and each pad will be approximately 35 feet square. All test pads will be supplied with three geothermal fluid types (steam, hot brine, and a bi-phase mixture of steam and saturated water) for optional use by experimenters. In addition, electrical services, cooling water and compressed air will be provided to the test pads, as will instrumentation to monitor the temperature, pressure and flow of the geothermal fluids.

The test pads will be covered by a roof to protect the test equipment from the rain.

24. Site Piping

Piping will be routed throughout the site on elevated pipeways. Pipe, pipe supports, and pipeway structures will be designed and painted and coded in such a manner as to permit efficient maintenance procedures.

Lines carrying hot fluids will be insulated for both personnel protection and heat conservation. Expansion joints or expansion loops and pipe anchors will be utilized where required. Vibration isolators will be used on pumps and air compressors. Bypasses and flanged connections will be used on control valves, flow orifices, and other equipment where frequent calibration or maintenance may be required.

25. Louvered Redwood Fencing

Slatted redwood architectural screens and selected plants will be placed around the site of the research power plant to mask the industrial appearance of the equipment.

26. Roads, Parking and Security

The access road and plant roads will be designed to handle the legal maximum length for highways of semi-trailers (55 feet).

Parking will be provided in close proximity to each of the operating functions of the research facility, as indicated in the plot plan. Parking areas and roads will be paved.

In addition to the entire area being surrounded with a fence, the switchgear yard and the maintenance and work yard are further protected with an 8-foot chain-link fence and barbed wire.

Lue

PLANNING COMMISSION

Planning Department
County of Hawaii

HEARING TRANSCRIPT
February 23, 1978

A regularly advertised public hearing, on the application of the State of Hawaii Department of Planning and Economic Development, was called to order at 7:33 p.m. in the Councilroom, County Building, South Hilo, Hawaii, by Chairman William F. Mielcke.

PRESENT: William F. Mielcke
Lorraine R. Jitchaku
Haruo Murakami
Bert H. Nakano
Alfredo Orita
William J. Paris, Jr.
Charles Sakamoto

ABSENT: Shigeru Fujimoto
J. Walsh Hanley

Ex-officio Member
Akira Fujimoto
Ex-officio Member
Edward Harada

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Ilima Piianaia, Planner

Lionel Meyer, Deputy Corporation Counsel

and about 13 people in attendance

CHAIRMAN: We'll proceed with public hearings, Number 7. Public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4 acres of land located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2. Staff?

PIIANAIA: (Presented background information on file.)

I'll circulate a small exhibit showing the proposed facility, but I believe the petitioner has a larger scale poster of this. Thank you.

CHAIRMAN: Thank you very much, Ilima. Members, of the Commission let's just review for a second before I open the floor for discussion. Again, a special permit. The purpose of a special permit is to use the land within the State Land Use Agricultural or Rural District for other purposes than uses permitted within these districts. The Planning Director's role is to make recommendations to the Commission and the Planning Commission's role is advisory of recommending approval adjudicatory, if denial. We are to conduct a public hearing, after 30 days but within 120 days of the receipt of the petition in order to afford the Commission an opportunity to receive information from the staff and from the petitioner. Will be taking public testimony this evening. However, as was stated in the background report and

Exhibit HH

I quote, "To date a final EIS has not been approved. Action cannot be taken by the Planning Commission till a final EIS has been approved." I would recommend to the Commission that the public hearing, at its conclusion this evening, be continued.

At this time, I would like to ask those members of the Commission if you have any questions of the staff's background report? If there are no questions of the staff's background report, I have had requests from two persons to provide testimony this evening and I will call them first and then we'll open up to the floor those persons who also wish to comment on this application. The Chair at this time would like to call Mr. Frank Skrivanek, the Deputy Director of DPED.

Mr. Skrivanek, we will swear you in. Do you swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

SKRIVANEK: I do.

CHAIRMAN: Will you please be seated and state your name into the microphone.

SKRIVANEK: Yes, my name is Frank Skrivanek, I'm the Deputy Director for the Department of Planning and Economic Development. I'm here to present public testimony on behalf of Mr. Kono, our Director who left for Washington, D. C., last night to participate in a national energy conference preceding the national governors' conference. This is an energy conference which was scheduled with the White House last November, but got postpone because some difficulties in Congress on acting on the energy bills. So it has been rescheduled and on behalf of Mr. Kono, I would like to present testimony.

I think, Mr. Chairman, as you had indicated earlier, in our petition we are also asking Mr. Keppler to present testimony and then we do have a number of people here for resource persons who may be able to answer detailed questions that you might have. Dr. Grabbe who is the manager of our Center for Science Policy and Technology Assessment; and also Ms. Esther Ueda who is with our Land Use Division of the Department; Mr. Bill Chen who is a project coordinator representing the University of Hawaii; Dr. Kamins who prepared the environmental impact study; also Dr. Siegel is here who has worked with him; and from HELCO we also have Mr. Niwao and Mr. Uemura, they are technical advisors to the project. So at this time I would like to present our written testimony and I think we do have one correction which I'll call to your attention when we get to that point. This is for the Special Use Permit for the geothermal research facility at Puna which was identified earlier by your staff.

(Mr. Skrivanek read and presented Mr. Hideto Kono's testimony, copy on file.)

CHAIRMAN: Thank you, Mr. Skrivanek. Members of the Commission, do you have any questions of Mr. Skrivanek at this point?

JITCHAKU: I have one question, Mr. Chairman.

CHAIRMAN: Commissioner Jitchaku.

JITCHAKU: I'm not sure if Mr. Skrivanek should be directed this question; however, the present facility has been idle for some time, do you foresee any problems in relation to the start of the operations?

SKRIVANEK: Due to it being idle, I would think not, but I would check. Would there be any -?

GRABBE: I think Bill Chen is our expert on that.

CHAIRMAN: Okay, Mr. Skrivanek, I think to help the Commission if they have questions, I'm going to ask all of your resource personnel to come up and be sworn in and then if there are questions that have to be answered by a particular individual, we can do that.

SKRIVANEK: Mr. Chairman, I should have mentioned we also have some diagrams which may be of interest to the Members of the Commission.

CHAIRMAN: Fine. The staff would be happy to assist you with the diagrams and put them up on the bulletin board. Members of the resources personnel, if you would all stand up, I'd like to swear you in at this time. Do you all swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

PERSONNEL: I do.

CHAIRMAN: All right, for purposes of identification we'll go from left to right and begin with yourself, sir.

GRABBE: My name is Gene Grabbe with the Department of Planning and Economic Development.

CHAIRMAN: Mr. Grabbe.

UEDA: I'm Esther Ueda with the Land Use Division of DPED.

CHEN: My name is Bill Chen. I'm with, this year on leave from the University of Hawaii with the Department of Planning and Economic Development and I'm also the Acting Project Coordinator for the well and generator program.

CHAIRMAN: Thank you.

KAMINS: I'm Robert Kamins, consultant with DPED.

SIEGEL: Sandy Siegel, University of Hawaii, environmental specialist.

NIWAO: I'm Jitsuo Niwao with HELCO.

CHAIRMAN: Thank you, Mr. Niwao. Okay, Commissioner Jitchaku, if you would like to rephrase your question? You had asked a question about phasing of the facility at the present time and whether there are any problems that are anticipated.

JITCHAKU: Okay, we'll direct this question to Dr. Chen then. Dr. Chen, do you foresee any problems with starting of the project, you know, since the project has been shut down for some time. We were wondering if you can foresee any problems or I'm sure with all our resource people and, you know, you may overcome some problems.

CHEN: No, I don't foresee any problem of starting or flowing the well again. The reason is, at this time, we have a positive well-head pressure of approximately 80 to 90 pounds. So any time we want to start the well, we can turn the valve and it will flash. But we usually will flow it very slowly for about 2 days to warm up the casing. We don't want the casing to crack so we very slowly warm it up and then after 2 days we can flash it at any time we wish.

JITCHAKU: Thank you.

CHAIRMAN: Thank you. Commissioners,, any further questions of Mr. Skrivanek or the resource personnel? Commissioner Murakami?

MURAKAMI: Maybe I should ask this question to the Deputy Director or the coordinator of the, I forgot what his name was.

SKRIVANEK: Frank.

MURAKAMI: But as you stated in your statement here, "To date a final EIS has not been approved. Action cannot be taken by the Planning Commission until the final EIS has been approved." How soon do you think that the EIS will be completed and approved?

SKRIVANEK: The EIS has been submitted to the Environmental Commission and it is in the 30-day review process. After they formulate, well, it's open for comments. Then after that 30 days, we have 2 weeks in which to respond to comments. Then the Environmental Commission will make its recommendations to the Governor who has the final sign off on it and we would expect this would be about the end of April, sometime in April. So I think this is one of the reasons that the Chairman has indicated the hearing to be held open until there is final approval on the Environmental Impact Statement.

CHAIRMAN: Mr. Skrivanek, I was looking at a document that was circulated among the Commissioners and just from a layman's standpoint, how does this facility as it's shown way down here, compare with some of the geothermal energy facilities that are operating say in New Zealand or Italy or Greenland. Is it the same or a similar type of facility?

SKRIVANEK: This, of course, is much smaller in scale because we're talking just about a test and research facility at this time. I am familiar only personally with the one in New Zealand which I visited last December and this one is built right across the street from one of their resort hotels. It's an inland resort area and the area covers probably in the neighborhood of 50 to 100

acres; and you see steam coming up. This is, I guess, the pressure is somehow released and there's an escape valve. You don't hear any noise from it. You can drive all in through there, and then it is piped, the distance looks about half a mile or more to the electric generator which looks like a typical power plant. It's all enclosed and again the only thing you hear there is just the turbines, the hum from the turbines; and surprisingly, as much publicity as that one, has had, it really attracts very few visitors. I guess because most of them in this area are people who live in New Zealand rather than foreign visitors. They, perhaps have seen it so many times that they're gotten accustomed to it. But out on the fields, you see the pipes coming from the wells and they do have the bins in them for the expansion joints, but otherwise the landscape is just as it was in its natural form. They haven't cut down, graded or anything of that nature. The only thing is you see the pipes and the steam. So ours here is a very small project compared to that. I have not seen the geysers in California although Dr. Grabbe is familiar with that.

CHAIRMAN: Would you care to comment on that, Dr. Grabbe?

GRABBE: Well, if you don't mind, I'll tell you with pictures I have that would lead into the present facility, which I have a larger chart here, and I can point out the various parts of it.

CHAIRMAN: That'll be fine.

GRABBE: This picture is merely an artists' conception of what a geothermal well is like. It's often been called nature's earth heat. You have hot magma down below and here's a flow of hot magma. The hot magma down here is the source of the heat, that's the earth's heat. In order for the pressure to be built up, there must be some layers of rock which are relatively impermeable, sort of a cap which makes the tea kettle. And if we drill through this and there's water that has percolated down here from some other point, flows in, is heated up when the drilling is done and this releases the steam and it comes out. And here it shows just typically a silencer/separator and a electric power plant with some re-injection. Some of you may have visited the well when it was being flowed for the first time, first few times. There was no silencer on it at that time and it made a lot of noise. It was very spectacular and very important. At that time the U. S. Department of Energy issued publicity statements about our well in Hawaii. So that was a historic moment when it was tapped and steam really came up.

This shows the test facility as it now stands. In the last picture you just saw the well. Since that time because of the noise problem, there has been a silencer attached and these are two large steel towers, very much like an automobile muffler. They are baffles and the steam goes around it and then eventually comes out the top. But the main, and it goes a very effective noise silencing. You can still hear a hum but it's a good silencing job. These are the mufflers that are used in New Zealand and also at Sierra Brit or in Mexico where they have facilities.

Finally, this is the proposed sketch of the geothermal test facility here for Hawaii. Now in a typical power plant, you have a steam boiler which provides the steam for the turbines and in a geothermal power

plant, the steam is provided by the well so you don't have a boiler or a smokestack and things of that sort. Also, most power plants are located, which burn oil, fossil fuel, are located near water areas where they can use water for cooling. Here in Hawaii, they're usually along the coast so that seawater is used for cooling. For a geothermal power plant, you must put the plant where the geothermal is, and usually there isn't a lot of free flowing cool water there. So that is the reason for cooling towers. So here is where the current well is located. As the steam comes up, it goes into a separator because there's a combination of steam and water. From there it goes over and runs the turbine and then after it comes through the steam is condensed and then it goes over to these three buildings over here which are the cooling towers. And those are things that you don't usually see at a conventional power plant. But they're very similar to those New Zealand or the Geysers in California.

Now, the biggest structure you see here is the test facility for testing electric and non-electric uses of geothermal energy and we visualize sort of three bays which were described by the staff. In these, we can carry out experiments on using heat to dry vegetables or for drying grains or coffee, you know, various agricultural purposes. We might set up some aquaculture experiments in these; and there are quite a variety of things that can be done. So that is the purpose of that.

The first item mentioned by the staff was some office buildings and the shop and storeroom. Those are the little buildings over here. The education visitors center is not shown on this plan because we didn't have it in as part of our original proposal, but the Department of Energy is very conscious of a successful project and I think the County too should be very proud of this. It would make a very nice addition to the project. As the facility is laid out, the appropriate location would be picked to put the visitors center so it's convenient for the public and parking and that sort of thing. Are there any questions about this?

SKRIVANEK: Gene, one question, I don't think you responded to the Chairman's question, how does this compare with the Geysers in size and scale.

GRABBE: Oh, it's much smaller because the typical plant of the Geysers is 55 megawatts which means cooling towers are about as large as this building; and there will be two or three of these at one site. Whereas, the cooling towers that were mentioned by the staff, I think are relatively smaller structures.

CHAIRMAN: It covers the principles of the thing?

GRABBE: Yes.

CHAIRMAN: Okay, Commissioners? Commissioner Paris?

PARIS: Oh, yes, I know in the statement you said you'd have a place in there where the sulfur would be removed, etc., where about would that be located in relation to this schematic?

GRABBE: This desulfuring unit is relatively a small unit over on the side there, and it was mentioned that there be a number, a lot of piping around because the steam from the condensers goes back to be desulfured before it goes into the cooling towers.

MURAKAMI: Mr. Chairman?

CHAIRMAN: Yes, Commissioner Murakami.

MURAKAMI: You know, on this cooling system, how do you cool, without water or with water? Do you have water in the cooling system?

GRABBE: Well, when the steam is condensed, part of it is used for cooling. The steam, you have to have some water to start with, but once you have the steam condensing, then you cool it and use that water, recirculate it for the condensers.

MURAKAMI: Oh, after you extract the water from the steam, you use that water for cooling?

GRABBE: That water is used for cooling, yes. About 20 percent of the water is lost in the process of cooling. Now, since we have such a hot well, we anticipate that when the steam comes out of the turbine and is condensed, there will still be quite a lot of heat. And we hope to extract that and put it to some useful purpose. At present, it's considered that we may not need a re-injection well but we can just, water seems to be a good quality and might even be used for agriculture or aquaculture.

MURAKAMI: But during the process, actually you have to have a certain amount of water before you can extract water from the steam, no? In other words, you have to have water in the cooling system when you actually start?

GRABBE: Yes, I should mention that this is a water-dominated system. It's not dry steam. So 40 percent of the material that comes up is water, and 60 percent is steam, is that right, Bill?

CHEN: Yes, to start out, you will have to have water, and then also we have to have some water for makeup, but the amount is very, very small for makeup. Most of the water will be recirculated.

MURAKAMI: Well, let me ask you, about how many gallons would you need in order to run this type of generating plant?

CHEN: At this time, I really can't answer you because of a lot of factors that we have not considered on the design. We have to get an engineering service contractor to design this system and we have to decide how big a system we want and what kind of cooling system and, you know, basic concept is what we have proposed here. But details as to exactly how many gallons, I really can't tell you at this point.

PIIANAIA: Mr. Chairman, I have a couple of questions. Dr. Chen just mentioned that what has been presented is a conceptual scheme and

that the proposed system has not really been designed yet. Do you have any idea how different from the proposed conceptual scheme the actual facility might be?

CHAIRMAN: Who would like to respond to that? Dr. Chen, would you like to respond to that?

CHEN: Yes, yes, I'll respond to that. The actual facility as I can see it now will not differ very much from what we have proposed here. There might be two things that might be different. One is we have not or we are proposing to do a study whether to re-inject, I shouldn't say re-inject, to inject the water back to the reservoir or to surface disposal and if we're going to inject it back to the reservoir then we need to drill a well for doing that; otherwise, we need a drainage pump.

PIIANAIA: Is that well, for the return system, is that well part of this application?

CHEN: If it's necessary to drill a well to dispose of the water, yes; then it will be.

PIIANAIA: So this would be a fourth amendment to the Special Permit application? It's not very clear in the application that there would be another amendment to the application.

GRABBE: I think that is correct because part of the decision will be that of the Department of Energy. They may wish to try re-injection as part of this system.

CHAIRMAN: Maybe we should note that.

PIIANAIA: Okay. May I proceed?

CHAIRMAN: Please.

PIIANAIA: Will the proposed facility, the research station, be confined within a 200 by 400 foot area, within approximately 1.8 acres? Do you foresee it extending beyond?

CHEN: Well, at this moment, I don't foresee it.

PIIANAIA: Okay.

CHEN: Let me, maybe I should continue, there's another possibility of things that might be different from this conceptual design. We also talked about a H₂S abatement system or hydrogen sulfide abatement system and the system that we have provided here is an iron catalyst system. There's a possibility and there's a good possibility that there are better H₂S abatement systems available since we made our first application. So we also have proposed a study in the research to study the best way of getting rid of the hydrogen sulfide. So there's a possibility that the hydrogen sulfide abatement system would not be exactly the same as it is right now.

PIIANAI: So if you don't use an iron catalyst system or an iron catalyst process for your H₂S abatement system, structurally do you think another system would be different?

CHEN: Yes. It might require, as to exactly what kind of difference I can't tell you at this moment, but there's one system that's under consideration. It's called "Stretford Process". It's been used in all the new Geyser steam plants right now and it will be a little different.

PIIANAI: For your cooling towers, the application says that you project a maximum height of 53 feet, do you foresee, exceed, for towers, cooling towers, exceeding 55 feet? Because within the Agricultural zone, under the County Zoning Code, there is a 55-foot height limit for towers and if you do foresee anything higher than that, you will have to make it part of the record now or eventually we might be talking about a variance for anything higher that is not included if this permit is approved.

CHEN: I don't think it will be exceeding that.

PIIANAI: The parcel under consideration or the area under consideration is 4.1 acres. The research station is expected to occupy approximately 1.848 acres, what will the rest of the area be used for and what is there now?

GRABBE: The rest of the area will be landscaped. As mentioned there would be a redwood fence around the facility. I think around the periphery, there will be a chain-linked fence also.

PIIANAI: Outside of the fence, there's a pond now, a holding pond, I understand.

GRABBE: The pond will be inside the fence, inside the chain-linked fence.

PIIANAI: Okay, outside of the facilities that's shown on your schematic, there really wouldn't be any use of the parcel or the remainder of the 4.1 acre area?

GRABBE: Well, we'll try to make it as beautiful as possible.

PIIANAI: No, in terms of use.

GRABBE: We have no planned use for it. The County may have some ideas. Parking is one of the needs, certainly at the visitors center. We haven't considered that, I guess. We should probably put that in as another amendment.

PIIANAI: I don't think I'm getting the answer I'm looking for. We have 4.1 acres under this Special Permit application. Of that 4.1 acres, everything that's been shown is expected to occupy approximately 1.8 acres and this would be on the more mauka side of the area. On the makai side, what would the use be if there is anything proposed? You know, why is this not confined to 1.8 acres instead of being a 4.1-acre area?

GRABBE: Well, the reason, when the University arranged for a parcel of land, they picked an area and how it was established exactly, I don't know. But the site which was given to the, not given, but access to the 4.1 acres was granted by the Kapoho Land for the purpose of drilling a well and testing it; and so in continuing the project, we just kept to that 4.1-acre area which is the original Kapoho agreement. I think the rest of the land would be left in its natural state. There will be landscaping which we feel will be desirable to make the facility attractive.

PIIANAIA: Thank you. Thank you, Mr. Chairman.

CHAIRMAN: Thank you, Ilima. Getting back to the scrubbers, Dr. Chen, the new units that you say are in operation at other facilities are they appreciably larger or smaller than the ones that you are proposing?

CHEN: I think they're approximately the same size. But there might be new facilities, you know, for example, I believe in the "Stretford Process" you don't need to have a sludge removal system, but you have to have another unit to apply the "Stretford Process". So I think, in total, structure wise it will be approximately the same structure.

CHAIRMAN: Okay, thank you. Commissioners, further questions? Commissioner Paris?

PARIS: In regard to subparagraph B, on page 7, you anticipate a nine-month construction period and during that time it's stated that you will have tests going before, effective equipment to control noise and odor are in effect, and you give the time limitation; but then further on down it says you may have these things in operation within a year and a half after the project start date, so that means you will be probably running this for about six to eight months without the more effective devices to control noise and odor. I'm just trying to interpret that.

PIIANAIA: What Commissioner Paris is referring to is the equipment shakedown tests.

CHAIRMAN: Who would like to respond to that?

GRABBE: I think the tests are planned during the daytime so that people will be away from their homes for the most part and there is noise of traffic and aircraft and other noises. At night was the time that the sound was most, even though it was a low muffled sound in a quiet area like Puna, it can be very distracting if it's continuous. So all the tests are planned during the daytime. I think Dr. Siegel can probably comment on the effect of H₂S or hydrogen sulfide.

CHAIRMAN: Dr. Siegel?

SIEGEL: We've had experience now on several occasions of seeing our test procedures from the warmup through flowing and

flashing experiment, and this has involved direct measurements of hydrogen sulfide right in the plume. And just in terms of concepts of environmental pollution, you can't possibly go higher anywhere in an area than in the plume itself, in terms of parts per million of pollutant. Because everything else has to be air diluted from that, even if the cloud that emanates bounces around the country side a little bit.

We've never been able to get up to OSHA standards in terms of personnel at the site, right in the plume at the wellhead, so we've had to work to be in violation there.

With respect to general ambient quality standards, a mere 100 meters away with new and sensitive detection equipment, we're down below the 30 parts per billion level of hydrogen sulfide of which the EPA now has its tightest requirements. And so by the time we get to a kilometer distance, a half a mile or thereabouts, we're still unfortunately in the human nose level. This is simply a matter of biology. Except for the most supersensitive laboratory detection equipment, the human nose is one of the best detectors of hydrogen sulfide. But we are far, far below by the factor, easily 100, any possible dangerous level and this is our primary concern.

Now, I'm talking about the condition, the well as it exists now and will exist before the abatement equipment is put in. After that, well, this would be a whole different situation with respect to anything even smellable in the vicinity, except for those personnel on the site.

CHAIRMAN: Thank you. Dr. siegel.

CHEN: No continuous test will be conducted until such time that a noise or much better noise or odor control system is installed.

CHAIRMAN: Thank you, Commissioners?

SAKAMOTO: I have one.

CHAIRMAN: Commissioner Sakamoto?

SAKAMOTO: Going back to noise, what type of turbine generator you're going to use? Like the plantation turbine generator makes a loud whistling sound, really hurts the ear.

CHAIRMAN: Mr. Niwao.

NIWAO: Yes, I presume that the generator that's going to be used, the low temperature and pressure type of turbine. The type that we have in our power plant is a high pressure, high temperature type with superheat. But this one, I think is going to be about below 200 pounds of pressure. So I think it's more something like the plantation type of turbine, but it would be a more modern model of that generator.

CHAIRMAN: And considerably more quiet?

NIWAO: I would presume so. Yes.

CHAIRMAN: That was really what your concern was, Commissioner Sakamoto?

SAKAMOTO: Yes.

CHAIRMAN: Commissioners, any further questions?

MURAKAMI: Mr. Chairman?

CHAIRMAN: Yes, Commissioner Murakami.

MURAKAMI: Maybe this question should be asked to Mr. Niwao. When the HELCO purchase the 1.5 megawatts of electricity, what kind of community can this energy provide? When I say community, maybe enough for Hilo or Puna or -?

CHEN: Well 1.5 megawatts is the energy that we deliver now to the Hawaiian Beaches area and Pahoa. Kapoho area uses about only 1 megawatt. So we can say approximately between 1,000 to 1,500 houses.

MURAKAMI: Thank you.

CHAIRMAN: Thank you.

GRABBE: May I just add that there's sort of a general rule that it's 1 kilowatt per 1,000 people.

CHAIRMAN: Thank you. Commissioners, if you have no further questions of Mr. Skrivanek or the resource personnel, we'll ask them to just be seated in the audience and I will at this time call Mr. Jack Keppler, the Managing Director of the County of Hawaii.

I'll have to swear you in. Do you swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

KEPPLER: I do.

CHAIRMAN: Will you please be seated and state your name into the microphone.

(Mr. Keppler read and submitted his written testimony, copy on file.)

CHAIRMAN: Thank you, Mr. Keppler. Commissioners, do you have any questions of Mr. Keppler? Commissioner Murakami?

MURAKAMI: I have one. You mentioned because of the escalation of oil, well let's say energy, in other words, if and when the time

comes when this geothermal is implemented and success, would the rate of the electricity or whatever the energy supply is, whether it's electrical or non-electrical, would the price come cheaper than what it is now?

KEPPLER: The price of energy, as I understand it, never is going to come cheaper than what it is now, that the price of energy of \$2.50 barrel in 1971, 1972, we're never going to see again. But the question is what is the price of energy that our children are going to pay, \$32 barrel, \$52 barrel, \$152 barrel.

MURAKAMI: This is why I'm asking you the question, if the geothermal, let's assume that geothermal is successful and we can produce electricity, whether it's electrical or non-electrical products, I'm asking whether the price is going to come cheaper. In other words, I won't be here but by the time that thing would go --.

CHAIRMAN: But I think Mr. Keppler's point is well taken. I don't think it's going to be cheaper, Commissioner Murakami, but I think it is going to be a matter of whether we have energy available or not.

KEPPLER: Let me put it another way. I think that the best indication that we've got from all of these resource people is that with the development of geothermal, one, we're going to be self-sufficient. We won't have to pay money to somebody else to buy energy. Two, best indications are that the price of energy from geothermal is cost competitive in big blocks of power development now; so that if ten years from now the price of oil is doubled, our energy costs, that amount, can be derived from geothermal, is going to be less than importing oil. And I think that's our general, what we generally want to set as goals for ourselves.

MURAKAMI: Yes, but when I went to the last symposium I understood differently. They said geothermal would be just as costly.

KEPPLER: Just as costly today. The problem is that, as you know, this kind of new development takes time. Commissioner Jitchaku discussed how this project has been sitting idle all this time, one year. That idleness was waiting for the Federal Government to get it together to fund it. If we continue a slow development phase, then we won't be in a position to be cost competitive, five, ten, fifteen, twenty years from now.

CHAIRMAN: Commissioners? Mr. Keppler, thank you very much. We'll ask you to remain. This is a public hearing and there may be public testimony or questions that come as a result of the public hearing that you may want to respond to. Ladies and gentlemen of the audience, we do invite any of you at this time who wish to comment on the application before the Commission to please indicate so by raising your hand and we will invite you and welcome your testimony.

JITCHAKU: All resource people.

CHAIRMAN: Members of the staff, do you have any further questions of the applicant or any of the resource personnel who are available to us this evening?

PIIANAIA: Staff has no questions in terms of, well, we'd like to reserve any further questions if the public hearing is continued until the final EIS has been approved and comments have been received from various agencies. I'd just like to point out for the record or put it on the record that the diagrams that were referred to are not being submitted as exhibits. Just in case in the future there is any need for that clarification, that perhaps if this is approved and forwarded to the Land Use Commission for their approval, then perhaps the applicant at that time could make either these or similar exhibits available for the record for the file.

CHAIRMAN: I think your point is well taken Ilima. Yes, Mr. Skrivanek?

SKRIVANEK: One additional comment. Your staff raised the question about the injection well, whether this should be amendment number 4. I think one of our exhibits showing the plot plan shows the injection well on there. So it's a question whether this is in the written portion of the application or on the exhibits and question whether this is another amendment or whether it's adequately covered already.

CHAIRMAN: Ilima, would you care to respond to that?

PIIANAIA: I'd just like to point out that in reading through the application, it wasn't all that clear and it's a point that should be clarified just as we wanted to clarify the height and other such things.

SKRIVANEK: Yes, to be on the safe side it may be good to include it in the text in addition to the plot plan.

CHAIRMAN: I think that's advisable.

JITCHAKU: Mr. Chairman?

CHAIRMAN: Commissioner Jitchaku?

JITCHAKU: I was going to mention a follow-up of Mr. Skrivanek's point. I was just concerned that maybe it would be a matter of record or a part of the application that in case or in the future that any other part of a project within the 4.1 acres that's contained and pertaining to the project, just in case we missed something that rather than stop the project and say oh we forgot to add this into the application, that maybe we should add a section in there where anything that was missed or part of this project that's contained within this 4.1 acres be added or be considered, of course with the Planning Director's and County of Hawaii's input, and things like that. I was just concerned because of the points that staff has made so that we're very anxious and all of us here I'm sure is gratified to hear that the project will be continuing and that nothing else stops the project. I was just concerned about that that maybe we can recommend as part of the County's input that anything contained within the project or within the 4.1 acres, pertaining to this particular project, be included and considered, with, of course, the County's reviewing.

CHAIRMAN: Commissioner Jitchaku, I think your point obviously is well taken, and Ilima in her comments concerning the fact that if we deem to continue the public hearing that it will of course give us an opportunity to study the environmental impact study, and also take into consideration any further information that the applicant would like to bring to our attention or include in the application or permit.

PIIANAIA: I just like to point out, Mr. Chairman, in regards to Commissioner Jitchaku's question is that if staff would recommend approval to you, as in other applications, and I know the Land Use Commission has brought up this point too, to give an open-ended approval without really knowing what the magnitude is, anything else or say 2.3 acres or 3.3 or whatever the difference is, at that time if something else were to be planned, I think it'd be appropriate, rather, for the petitioner to come back and amend the special permit and to request something. Because if you leave it open-ended, your review powers may be limited.

CHAIRMAN: I would hope that between now and the time that we come back with the EIS that if there are any amendments at that time they would be submitted. If there is no further testimony to come up this evening, the Chair would like to entertain a motion to continue the public hearing.

JITCHAKU: Mr. Chairman.

CHAIRMAN: Commissioner Jitchaku.

JITCHAKU: I move that this Commission continues the public hearing.

CHAIRMAN: Is there a second to the motion?

PARIS: I second the motion, Mr. Chairman.

CHAIRMAN: It has been moved by Commissioner Jitchaku and seconded by Commissioner Paris that the application of the State of Hawaii Department of Planning and Economic Development for a special permit be continued. We'll take a roll call vote.

PIIANAIA: Mr. Chairman, for point of clarification, is the motion to continue the public hearing until such time as the Environmental Impact Statement is finalized and approved by the Governor?

JITCHAKU: Yes.

CHAIRMAN: I'm terribly sorry. That's the way I understood it. I should have stated it that way.

PIIANAIA: (Took roll call vote).

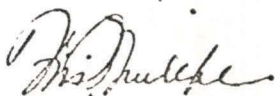
Seven ayes, the motion carries.

Public hearing adjourned at 9:00 p.m.

Respectfully submitted,

Sharon M. Nomura
Secretary

A T T E S T :



William F. Mielcke
Chairman, Planning Commission

LUC

PLANNING COMMISSION

Planning Department
County of Hawaii

HEARING TRANSCRIPT
April 27, 1978

A regularly advertised public hearing, on the application of the State of Hawaii Department of Planning and Economic Development, was called to order at 7:57 p.m., in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke presiding.

PRESENT:	William F. Mielcke	ABSENT:	J. Walsh Hanley
	William J. Paris, Jr.		Shigeru Fujimoto
	Haruo Murakami		Lorraine R. Jitchaku
	Bert H. Nakano		
	Alfredo Orita		Ex-officio Member
	Charles H. Sakamoto		Akira Fujimoto

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Keith Kato, Planner

Edmund Morimoto, representing Ex-officio Member Edward Harada
Lionel Meyer, Deputy Corporation Counsel

and about 15 people in attendance

CHAIRMAN: We will proceed with the next item on the agenda. The continuation of a public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4.0 acres of land located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2. Staff?

HAYASHI: (Presented background information on file.)

CHAIRMAN: Thank you, Mr. Hayashi. Members of the Commission, we had that benefit of the previous public hearing of accepting testimony from Mr. Jack Keppler, and also from Mr. Hideto Kono, and before us tonight is just one addition for clarification, request of the entire 4.1 acres be approved for the proposed facility. Do you have any questions at this time of the staff?

If there are no questions of the staff, is there a representative of the applicant or the applicant present? Yes, I'd like to at this time swear you all in. If you'll raise your right hands please. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

Exhibit UU

KEPPLER: I do.

CHEN: I do.

UEDA: I do.

CHAIRMAN: Would you please be seated and if we can start, Jack, with yourself and go down and have everyone introduce themselves for the record.

KEPPLER: My name is John P. Keppler, Managing Director of the County of Hawaii, representative of the County of Hawaii on the Hawaii Geothermal Development and HGP-A project.

CHEN: My name is Bill Chen. I am the acting project manager for the Hawaii geothermal project wellhead generator program, and I'm also the geothermal energy program manager for the Department of Planning and Economic Development.

UEDA: My name is Esther Ueda and I'm with the Land Use Division of the Department of Planning and Economic Development.

CHAIRMAN: Thank you very much. You've heard the staff's background report and their statement of the change that you've proposed since our last hearing. Do you have anything else that you would like to add at this time?

CHEN: No, we don't.

CHAIRMAN: Okay, yes, Ms. Ueda.

UEDA: I wonder if I could add one thing?

CHAIRMAN: Surely.

UEDA: For your information, we did discuss the revised conceptual plan with the Office of Environmental Quality Control, and they informed us that this is a nonsignificant change and therefore a mere filing of the plan with them would be sufficient. We have done so.

CHAIRMAN: Thank you. Okay, I might ask you to please be seated up here on the front row. This is a public hearing and the Commission will be accepting testimony and we may ask you to respond to some of the questions.

Ladies and gentlemen in the audience, this is a continuation of a public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a special permit. Before I ask for testimony from the audience, I want to review the special permit criteria, and the Planning Director's role and the Planning Commission's role. The purpose of the special permit is to use land within the State Land Use Agricultural Rural Districts for other than uses permitted within these districts. The Planning Director's role is to review and make recommendations to the Planning Commission. The Planning Commission's role is advisory.

If recommending approval, adjudicatory, if recommending denial. It is our responsibility to conduct a public hearing after 30 days but within 120 days from the receipt of the petition. This will allow the Commission the opportunity to receive information from the staff and the petitioner; and public testimony will be taken. No testimony rebuttle allowed after the public hearing is closed. Voting, at this point, would be a motion to continue the public hearing or a motion to close the public hearing. No action on special permits is taken until after the public hearing is closed and a 15-day waiting period has been concluded.

I would also like to review for you from the State Land Use Commission's Rules of Practice and Procedure in District Regulations, Part V, Special Permits. Petition before the County Planning Commission - Any person who desires to use his land within the Agricultural Rural District for any use other than agricultural or rural use may petition the County Planning Commission in which the land is located for permission to use his land in the manner desired. Test to be applied - certain "unusual and reasonable" uses within the agricultural or rural districts other than those for which the district is classified may be permitted. The following guidelines are established in determining "unusual and reasonable uses" (1) such use shall not be contrary to the objectives sought to be accomplished by the State Land Use Laws and Regulations, (2) that the desired use would not adversely affect the surrounding property, (3) such use would not unreasonably burden the public agencies to provide roads, streets, sewers, water, drainage and school improvements, and police and fire protection, (4) that unusual conditions, trends, and needs have arisen since the district boundaries and regulations were established and (5) that the land upon which the proposed use is sought is situated for the uses permitted within the district.

So we will be accepting testimony from the public on the special permit application. I'd like to ask that you speak to the application and to the test to be applied for the granting of the special permits. At this time, I would like to invite anyone from the public who would like to speak for or against this application.

STILLS: Mr. Chairman?

CHAIRMAN: Yes, sir, gentleman in the front. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

STILTS: I do.

CHAIRMAN: Please be seated and if you would identify yourself into the microphone.

STILTS: I'm James Stilts, Mr. Chairman, and I am Chairman of the Leilani Community Association on geothermal. And we are concerned on this thing inasmuch as the Leilani Estates, it doesn't show on your map here, but if you will notice Leilani Estates comes this way to your map there. We have 2,460 acres in there, and it's a potential of a pretty good size population some time later. Now, I want to make it clear that we're not against geothermal in no way whatsoever, other than we want to know how it's

going to affect us and what benefits we're going to get from it. Now, we take the position there that this things that's been such a big question, where everyone have fee simple title to this land there, and that means to us that we own the mineral and everything underneath us and we do take that position. Now, there is this, now I live on Moku Street which is two miles, almost two miles from this particular well in question there, and when they've been testing it, why I can't smell it at my house; but if I'm asleep, it will actually shake my house when, of course, we realize that when they get to using it, it's not going to be like it would be on the test.

But then I took a trip one particular day down to the well when they were testing it to see how far I could smell the sulphur, and I could smell the sulphur at Makema Street which is just about a mile from the well. And when the wind is just right now, you can get up close to the well when they're testing it and you can't even smell it, but if the wind is just right, it will bring that sulphur smell, I believe, most of Leilani Estates there.

Now we have made a small survey and what we would like to know to is how this geothermal energy, if it's going to be used for electricity or what. Now, we read where in Iceland, which is a big country, that's affected the whole entire island there, is using geothermal energy for just about everything. They heat their homes with it, and they grow bananas on the ice, tomatoes, and everything else. And we're just wondering if this thing is going to be just used for electricity or is everybody going to have some benefit from it, and we want to know just what is going on.

CHAIRMAN: Okay, Mr. Stilts, Dr. Chen, at our last meeting, did address himself to those very questions; and I will ask him to briefly respond to you today concerning the questions that you have raised in terms of effects, benefits, noise and smell, and what's happening in Iceland and what could potentially happen here on the Big Island.

STILTS: Thank you, sir.

CHAIRMAN: Are you ready for that, Dr. Chen?

CHEN: The project is committed to reduce the noise and the smell level as much as the present technology is possible to do it. If the technology tells us that we would not be able to scrub out all the way to the point that it's reasonable, I think we have to really take a serious look at it and see whether it's worth the environmental degradation for us to use it; but we don't know. And that's the reason for this research demonstration project. Certainly, all kinds of other non-electric uses that can be utilized, but it needs to be demonstrated, and that's why we proposed this research facility. And I won't be here and doing this work if I did not believe that it will benefit all of us.

CHAIRMAN: Okay, as I recall, your testimony at our previous public hearing, you said that you've really given considerable thought to the sound baffles and particularly the scrubbers and that there have been major modifications since the initial drilling.

CHEN: It will be, yes. The technology of a hydrogen sulfide scrubbing system or the sulphur scrubbing system is growing at leaps and bounds so that we do not want to identify specific processes at this moment, because maybe two months later we'll have a better system, and we want to utilize the best possible technology that's available at that time.

CHAIRMAN: Thank you. Mr. Stilts, does that answer your question generally?

STILTS: Generally. There's one other thing that I do want to bring up.

CHAIRMAN: Please come forward.

STILTS: Thank you. Now we read where in the case of electricity, well say for instance that it's going to be used, that there would be no reduction in rates. Now this report that we have from Iceland, they were using oil there to heat, and oil to cook and just about everything with oil prior to the latest eruption that they've had there, and now they are just practically using the steam for the whole island. And oil was costing for the average home between \$80 and \$90 a month. And when they started using the geothermal energy there, it was reduced to \$20 per month. There's one big difference; and I can't see why that, if Iceland can do that on the iceberg up there why we can't have some reductions here.

CHAIRMAN: Okay. Mr. Stilts, let me just say to you that the Commission, of course, is interested in what the cost of electricity is going to be. But we're really going to address ourselves to the question which is before the Commission, and that is, whether the special permit ought to be favorably acted upon; and the cost of electricity is not something that the Commission is really going to concern itself with tonight. We share that concern as private citizens here, but that's not really the question before us tonight.

STILTS: Okay, I see.

CHAIRMAN: The Chair will, at this time, ask anyone else in the audience who would like to testify before the Commission concerning this application. Yes, sir, if you'll come forward. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

KAHALOA: Yes.

CHAIRMAN: Would you please be seated and state your name into the microphone.

KAHALOA: Good evening, gentlemen. My name is James Kahaloa and I am a resident of Opihikao, Puna. I am here to testify in behalf of the Puna Hui Ohana, a non-profit organization which was formed by native Hawaiian residents of the lower Puna area. The Puna Hui Ohana was created as a result of a growing awareness among the native Hawaiians of lower Puna that an organized effort was needed to overcome the many barriers which prevented us from

achieving a level of self-sufficiency once enjoyed by our ancestors. The primary objectives of the Puna Hui Ohana are (1) to create and provide opportunities which enhance the self-sufficiency of the native Hawaii people of lower Puna and (2) to preserve and perpetuate our traditional Hawaiian culture, aboriginal rights, and lifestyle.

We have reviewed the environmental impact statement prepared for the proposed project which is the subject of this public hearing. Based on our review of the EIS, the Puna Hui Ohana recommends that the Department of Planning and Economic Development's request for a special use permit to establish a permanent geothermal facility at Pohoiki, Puna, be denied.

Our recommendation is based on the fact that the EIS fails to properly recognize and take into consideration the impact of the proposed project on the aboriginal rights of the native Hawaiian people. It is our feeling that the project, as proposed, will have a tremendous negative impact on our aboriginal rights.

The EIS fails to recognize that native Hawaiians have aboriginal rights to use natural resources such as geothermal energy. These rights are supported by the following historical facts:

1. Our ancestors enjoyed prior use of this precious resource. Steam was used for cooking and warming of food wrapped in Ti leaves, and so forth.
2. Up until the forceful overthrow of Queen Liliuokalani in 1893, mineral rights within the Hawaiian Islands were reserved to the sovereign Hawaiian nation. Because the overthrow was supported by armed forces of the United States Government, it constituted an illegal act. As a result, native Hawaiians are now seeking restoration of land, sovereignty, and native rights, including mineral rights, from the federal government.

The EIS, however, ignores these facts and falsely assumes that the State in developing the geothermal facility has the right to sell the energy that is produced. For instance, on page 4, the EIS states, "Up to three megawatts of the electricity generated, surplus to the needs of the geothermal station, will be purchased by the Hawaii Electric Light Company (HELCO)."

It goes on to say on page 49 that the State would derive economic benefits from geothermal development by receiving royalties from geothermal deposits which it has reserved.

We believe these kinds of assumptions illustrate the State's complete disregard of and insensitivity to our aboriginal rights, and we are prepared to challenge what we feel is the State's encroachment upon these rights.

We realize that if this special use permit request is denied it may set back the development of geothermal energy in Hawaii. However,

we feel, and we ask you to understand, that in our struggle to perpetuate our race and culture in this complex technological society, we cannot allow our aboriginal rights to go unrecognized.

Mahalo.

CHAIRMAN: Thank you, Mr. Kahaloa. We appreciate very much your testimony this evening. Again, as I mentioned to Mr. Stilts, the Commission is going to direct its decision this evening on the question that is before it concerning the special permit; and we on the Planning Commission are not in a position to make any kind of ruling on aboriginal rights whatsoever. It's not in our jurisdiction.

The Chair, at this time, would like to invite anyone else from the audience who would like to present testimony. Yes. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

MORSE: I do.

CHAIRMAN: Please be seated and state your name into the microphone.

MORSE: My name is Stephen Kane-a-I Morse. I'm a resident of Malama Ki, Puna, which is less than a mile from the proposed geothermal facility. I am here to speak as a director of the Native Hawaiian Legal Corporation, formerly know as the Hawaiian Coalition of Native Claims. The Native Hawaiian Legal Corporation is a non-profit tax exempt corporation which was created in 1974 for the purpose of providing legal research and documentation of native Hawaiian rights as a means of educating the general public as to the existence of these rights and the need to properly safeguard these rights for future generations of native Hawaiians.

I'm here tonight basically to speak against the approval of the special use permit for a number of reasons, some of which Mr. Kahaloa has already outlined, but I would like to add to his comments that one of the native rights that we have documented for native Hawaiians is the right to practice their traditional religion, and that energy which is the project proposes to tap and sell is a physical manifestation of that religion. Our kupuna, our elders, refer to that energy as Pele, the legendary fire-goddess. One of our kupuna, an elderly Hawaiian woman of Ka'u who prefers to remain anonymous, provided us with her mana'o, her thoughts, on this matter, and I would like to take the time to quote some of these remarks from her.

"Aloha! Please lend me your ears in a story that was told to me, a story of love and yet a sadness. Energy, that is something I do not understand. To me energy is Pele. Pele is the giver and also a taker, to ask me who has the right to her? I cannot answer that, for she was here before life itself. I was taught to honor her in everything and never to do wrong on her grounds.

We were aware of the goodness she offered to us, we accepted and appreciated what we had and left it in

its natural form for others to enjoy when they needed to. When a natural form is mistreated or misused, that sacredness of that natural form and all that exist within its boundaries will be destroyed. Remember warm springs and the beauty this natural pond had? The ponds were naturally sectioned separately for children and adults. In the center of the pond was an island, under water a secret cave, Hawaiian herbs surrounding the area. This natural beauty turned into a tourist trap with a 10 cents, 25 cents, then \$1.25 charge. This you remember was destroyed by lava.

The energy Pele explodes belongs to her and is her. To fight over the right of her or who should have control is not for me to say for I am a Hawaiian. Who am I to say? Who would listen to me? I've been told it is wrong to believe energy is Pele. I have also been told this energy could be put to good use for our people and others on the island. But to me Pele is the last of our Gods. I for one will not fight over her or try to get ownership of her. She belongs to us in our own sacred ways.

I'm here to say tonight, gentlemen, that by drilling and selling this energy to us is nothing short of sacrilegious, at least to those of us who still believe in the traditional Hawaiian religion. We would no more sell Tutu Pele than you would sell your Jesus Christ, your Buddah, or whatever spiritual power that you place your utmost faith and belief in.

The proposed project, I contend, would interfere with our right to religious freedom. A freedom which I may remind you is even guaranteed by the United States Constitution and more recently by a Congressional Senate Resolution introduced by Senator James Abourezk of South Dakota and Senator Spark Matsunaga which sets forth a clear policy of religious freedom for traditional American Indians, Native Alaskans and Native Hawaiians. I'd like to quote also from some of the Congressional Record pertaining to that resolution;

"One of the most fundamental precepts in the founding of our country is the freedom of religion Indians have an inherent right to the free exercise of their religion. That right is reaffirmed by the U. S. Constitution in the Bill of Rights as well as by many State and tribal constitutions. The practice of traditional native Indian religions, outside the Judeo-Christian mainstream or in combination with it, is further upheld in the 1968 Indian Civil Rights Act.

However, in recent years, there have been increasing incidents of abrogation of the religious rights of American Indians. New barriers have been raised against the pursuit of their traditional culture, of which religion is an integral part.

It is clear that these incidents did not result from a Government policy to abridge the religious freedom of Indians. Rather, events were allowed to occur, because there was a lack of Government policy."

So I'm here tonight, gentlemen, to just say that I think it's a mistake at this point to go ahead and allow this special permit to go through, mainly because there's very serious questions concerning the impact it has on aboriginal Hawaiian people and their culture and I just hope that you folks understand that it's very important to us that our desires and our culture be given the utmost consideration in your decision. Mahalo.

CHAIRMAN: Thank you, Mr. Morse. Anyone else from the audience who would like to testify before the Commission this evening? Do swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

LEE LOY: My name is Genesis Namakaokalani Lee Loy. My statement tonight will be a short one. I'd like to say for the head of the household of 14, I speak for these members also, I am a native Hawaiian and I echo the sentiments and thoughts of the previous two speakers that spoke about Hawaiian aboriginal rights and Hawaiian rights, our native rights. Thank you.

CHAIRMAN: Thank you. Anyone else from the audience who would like to testify? Yes, Mr. Cooper. Mr. Cooper, do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

COOPER: I do. May I speak from there?

CHAIRMAN: You certainly may.

COOPER: First of all, is this the EIS? Is this is the public hearing on this EIS?

CHAIRMAN: No, it is not.

COOPER: You know, I'm really concerned about this geothermal energy. It's amazing this question is coming up to you. Ever since this thing came to, there have been many people, especially Hawaiians who are concerned about this. And I stand here tonight and I look at the makeup of your Board here, and I feel, you know, a little bit what we call hilahila. I want to tell you about the history, because it's obvious that none of you gentlemen here know anything about the history. But our nation was overthrown in 1893 by a handful of haoles, transient, mainland type people. It was overthrown because there was a warship in the harbor and it was overthrown by force. Until this day, we have never had a settlement with the United States.

Now I want to tell you a little bit about what happened. When Captain Cook discovered these islands, there were about 550,000 Hawaiians here. A hundred years later, the Hawaiians are down to 47,000. But still, they were about 96 percent of the population. Twenty-two years later, the Hawaiians were down to 27,000 people, less than 18 percent of the population. The government was overthrown, they couldn't even vote, by force. Today, where are the Hawaiians? They're sure not in the State government, the County government, they're not too many that sit on your boards. It's a very sad situation. The Hawaiians stuck at jails, unemployment, drop-outs, they're not in your hotel industry except as servants. They're not in the County, they're not in the State Government, they're not in the Federal Government.

And here, this is a very important matter. You see, you're talking about our aborigine rights. Geothermal was used by our people far before any of you people came here. It was used for heat, it was used for cooking, it was used for medicine, but it was mostly used because of the religion. Now many people still believe in Pele and still worship Pele, and I don't really think that you have a right to go down into these lands and give, you know, your Board, give permission on a special permit so that they can take these rights.

I believe legally the question has never been answered. The State has, as you know, rules and regulations on geothermal, but I don't think the State owns this. This is owned by the Hawaiian people, by the Hawaiian Nation. And I feel, gentlemen, that there has been a lot of precedence set. The Alaskans, for instance, got all their natural resources including water, oil, everything that comes up, gold, silver. The Indians own all their natural resources. And now the Hawaiians who also are native Americans has none of these rights? I feel, gentlemen, that it's nice to sit on the Board and make all kinds of decisions, but I think that this is a very important decision that you have to make; and I feel it's not a right decision to make until the State can work out with the Hawaiian people what share of this geothermal heat will be theirs. But most of importance, because of the religious factors, I believe you have no right to tamper with this thing.

I'm very upset, and all this time that this geothermal stuff has been going on, the University has never kept up with us, Dr. Shupe, your Department of Economic Development, nobody has kept us posted. We've talked to them, we've asked them, we've asked the County, we've asked Garcia over here in this County, never ever keep us posted on what's happening. And I want to tell you that it's a very important decision. And I ask that you defer this until the Hawaiians are considered, their aborigine rights, their Gods, and their culture. Do you have any questions? No questions?

CHAIRMAN: Commissioners, do you have any questions of Mr. Cooper?

PARIS: I have one, no question of Mr. Cooper, but I'd like to state that I think I'm as much as, I'm as good a Hawaiian representative as anybody. You refer that I have no representation on this Board. My great, great grandmother was Princess Kipikane from the Court of King Kamehameha the first.

COOPER: I know that.

PARIS: And my great, great, great grandfather was the Chief of the lands of Manuka to Kapua and South Kona. So I do have Hawaiian blood in my veins and I'm conscious.

COOPER: Thank you, Mr. Paris. I hope that the rest of you on this Board will be very conscious because this is a very important issue. Geothermal is a very, very important issue. Thank you.

CHAIRMAN: Thank you, Mr. Cooper. I also would like to acknowledge Mr. Kanuha who is Hawaiian.

The Commission's, again, role in this question is not to make a decision about aboriginal rights, is to make a decision as to whether to send a favorable recommendation to the State Land Use Commission concerning special permit, and I don't want to lose sight of just what the application is before us this evening.

I will, at this time, welcome anyone else who would like to speak either for or against this application. If there is no further testimony to come before the Commission, the Chair will entertain a motion to close the public hearing.

MURAKAMI: Mr. Chairman?

CHAIRMAN: Commissioner Murakami.

MURAKAMI: I move that the public hearing be closed.

CHAIRMAN: Is there a second to the motion?

ORITA: Mr. Chairman, I second the motion.

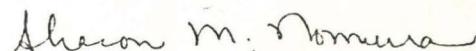
CHAIRMAN: It has been moved by Commissioner Murakami, seconded by Commissioner Orita that the public hearing be closed. All those in favor so signify by saying aye?

COMMISSIONERS: Aye.

CHAIRMAN: Oppose, same sign? The public hearing is closed. Action on this application for a special permit cannot be taken until the completion of a 15-day waiting period after the conclusion of the public hearing. The action that will be taken at that time will be a motion to defer, a motion to deny, or a motion to send a favorable recommendation to the State Land Use Commission.

Public hearing adjourned at 8:36 p.m.

Respectfully submitted,



Sharon M. Nomura
Secretary

A T T E S T:



William F. Mielcke
Chairman, Planning Commission

PLANNING COMMISSION

Planning Department
County of Hawaii

EXHIBIT FFF

MINUTES
June 1, 1978

The Planning Commission met in regular session at 1:00 p.m. in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke Presiding.

PRESENT: William F. Mielcke
Shigeru Fujimoto
Lorraine R. Jitchaku
Haruo Murakami
Bert H. Nakano
Alfredo Orita
William J. Paris, Jr.
Charles H. Sakamoto

ABSENT: J. Walsh Hanley
Ex-officio Member
Akira Fujimoto

Sidney M. Fuke, Director
Ilima Piianaia, Planner
Keith Kato, Planner
William Moore (Left at 4:30 p.m.)
Francis Saiki (Left at 4:30 p.m.)

Galen Kubo, representing Ex-officio Member Edward Harada
Lionel Meyer, Deputy Corporation Counsel

and about 9 people at 1:00 p.m., 7 people at 3:37 p.m.,
and 21 people at 6:30 p.m.

All those testifying were duly sworn in.

SPECIAL PERMIT
STATE OF HAWAII
DEPARTMENT OF
PLANNING AND
ECONOMIC
KAPOHO, PUNA

Application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4.0 acres of land

located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2.

Staff presented recommendation for approval with conditions on file.

With regard to Condition 1, Commissioner Jitchaku asked for a clarification on whether the State can go ahead with its plans as far as the operational process if the landowner hasn't submitted a subdivision plan. Staff responded that Condition 1 is worded such that the test well could be operated, but plans for subdivision have to be submitted and receive tentative approval within one year.

The petitioner's representative, Bill Chen, was in attendance. With regard to Condition 10, Mr. Chen said that as they are going to build a visitor information center, they will be needing two accesses so that busses can go in one way and out the other, rather than have a turn-around area. Mr. Chen asked about an existing 20-foot easement on the southern side of the property which provides access to another property. Staff replied that it would be considered as one access. The Planning Director pointed out that if they elect not to utilize that easement because it doesn't suit their purposes, then they would have to extinguish that easement and find another easement as the Department is trying to minimize the accesses. He added that another alternative could be to retain that easement, but within the parcel, they would have to eventually hook it up to that particular point but provide an interior circulation system.

It was moved by Commissioner Murakami and seconded by Commissioner Jitchaku to send a favorable recommendation to the State Land Use Commission with the conditions outlined by the staff. A roll call vote was taken and motion carried with eight ayes.

SPECIAL PERMIT
KONA CHURCH
OF GOD
KOHANAIKI,
NORTH KONA

Application of Kona Church of God for a Special Permit to allow the establishment of a church on 1.139 acres of land situated within the State Land Use Agricultural District. The property involved is located along the makai side of the Mamalahoa Highway,

approximately 650 feet north of Kaloko Drive, Kohanaiki, North Kona, TMK: 7-3-19:24.

Staff presented recommendation for approval with conditions on file.

STATE OF HAWAII
LAND USE COMMISSION
Suite 1795
Pacific Trade Center
190 S. King Street
Honolulu, Hawaii 96813

July 3, 1978

Mr. Sidney Fuke, Planning Director
Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

Enclosed is a Notice of Land Use Commission meeting and the Agenda for the Meeting.

Please note that petitions

SP77-261(B) - BOISE CASCADE HOME AND LAND CORPORATION

SP78-300 - CAL-GA-CRETE HAWAII, INC.

SP78-301 - THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

SP78-305 - HIROSHI MATSUYAMA

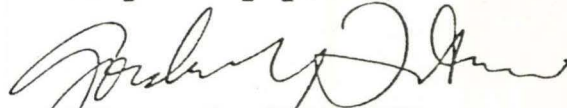
SP78-306 - KONA CHURCH OF GOD

SP78-307 - DPED (Geothermal Research Facility)

will be acted on at that time.

Should you have any questions on these matters, please contact this office.

Very truly yours,


GORDAN Y. FURUTANI
Executive Officer

Enclosure - Agenda

STATE OF HAWAII
LAND USE COMMISSION
Suite 1795
Pacific Trade Center
190 S. King Street
Honolulu, Hawaii 96813

July 3, 1978

Mr. Hideto Kono, Director
Dept. of Planning & Economic Development
State of Hawaii
250 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Tatsuo Fujimoto, Head, Land Use Division

Dear Mr. Kono:

Enclosed is a Notice of Land Use Commission meeting and the Agenda for the Meeting.

Please note that petitions

A77-433 - ENCHANTED LAKE PARTNERS

✓ SP78-307 - DPED (Geothermal Research Facility - Hawaii)

will be acted on at that time.

Should you have any question on these matters, please contact this office.

Very truly yours,


GORDAN Y. FURUTANI
Executive Officer

Enclosure - Agenda

STATE OF HAWAII
LAND USE COMMISSION

NOTIFICATION OF LAND USE COMMISSION MEETING

DATE, TIME & PLACE

July 18, 1978 - 9:30 a.m.
Conference Room 322 (B & C)
New State Building
1151 Punchbowl Street
Honolulu, Hawaii

A G E N D A

I. ACTION

1. A77-433 - Enchanted Lake Partners (Hearing Officer)

To reclassify approximately 2.8 acres of land presently in the Conservation District into the Urban District at Kailua, Koolaupoko, Oahu, for residential use.

2. SP77-261(B) - Boise Cascade Home and Land Corporation (Hawaii)

To amend Special Permit 77-261(B) to allow the construction of a centralized parking area for hotel use on approximately 7.9 acres of land situated within the State Land Use Agricultural District at Waikoloa, South Kohala, Hawaii.

3. SP77-265 - Geothermal Exploration & Development Corporation
Time Extension Request (Hawaii)

To allow a one year extension of time to commence drilling of exploratory geothermal wells within the State Land Use Agricultural District at Opihikao, Puna, Hawaii.

4. SP78-300 - Cal-Ga-Crete Hawaii, Inc. (Hawaii)

To allow the retail sale of building materials on approximately 1.23 acres of land situated within the State Land Use Agricultural District at Waikoloa, South Kohala, Hawaii.

5. SP78-301 - The Church of Jesus Christ of Latter-Day Saints
(Hawaii)

To allow the establishment of a church on approximately three (3) acres of land situated within the State Land Use Agricultural District at Keaau, Puna, Hawaii.

6. SP78-305 - Hiroshi Matsuyama (Hawaii)

To allow the establishment of a country general store and a service station facility on approximately .852 acre of land situated within the State Land Use Agricultural District at Kalaoa 5th, North Kona, Hawaii.

7. SP78-306 - Kona Church of God (Hawaii)

To allow the establishment of a church on approximately 1.14 acres of land situated within the State Land Use Agricultural District at Kohanaiki, North Kona, Hawaii.

✓ 8. SP78-307 - Dept. of Planning & Economic Development (Hawaii)

To allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4.1 acres of land situated within the State Land Use Agricultural District at Kapoho, Puna, Hawaii.

9. SP78-303 - Arthur Kuwahara, et al. (Maui)

To allow the construction of a second dwelling unit on a 43,255 square foot (.993 acre) parcel of land situated within the State Land Use Rural District at Kula, Maui under the provisions of Act 140, SLH 1977.

10. SP78-304 - Kapalua Land Company, Ltd. (Maui)

To allow the development of a golf course on approximately 144 acres of land situated within the State Land Use Agricultural District at Kapalua, Maui.

11. SP78-308 - Ameron HC&D Maui (Maui)

To allow the establishment of a concrete batching plant on approximately 1.783 acres of land situated within the State Land Use Agricultural District at Kihei, Maui.

12. SP78-302 - Pacific Concrete & Rock Company, Ltd. (Oahu)

To allow the expansion of a quarry operation on approximately 59 acres of land situated within the State Land Use Agricultural District at Waimanalo, Oahu.

II. MISCELLANEOUS

1. Adoption of Minutes APR 13 1978 MAY 11 1978

7/5/78 - A COPY OF THIS AGENDA WAS MAILED TO ALL PERSONS AND ORGANIZATIONS ON THE ATTACHED MAILING LISTS:

1. STATEWIDE 2. OAHU 3. HAWAII 4. MAUI



COUNTY OF
HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720

HERBERT T. MATAYOSHI
Mayor

SIDNEY M. FUKU
Director

DUANE KANUHA
Deputy Director

June 16, 1978

Mr. Gordan Furutani
Executive Director
Land Use Commission
190 South King Street
Suite 1795
Honolulu, HI 96813

SP78-307

JUN 19 3 31 PM '78
LAND USE COMMISSION
STATE OF HAWAII

Dear Mr. Furutani:

Special Permit Application
Petitioner: Department of Planning
and Economic Development

In accordance with Chapter 205, Section 205-6, Hawaii Revised Statutes, we are transmitting the decision and findings of the County Planning Commission on the above application.

The special permit request was to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District at Kapoho, Puna, Hawaii, Tax Map Key 1-4-01:portion of 2.

The Planning Commission at its duly advertised public hearings held on February 23 and April 27, 1978 in the Councilroom, County Building, South Hilo, Hawaii, discussed the subject request. The Commission on June 1, 1978, voted to recommend the approval of the special permit to the Land Use Commission based on the following findings:

1. The proposed use will not be contrary to the objectives sought to be accomplished by the State Land Use Law and Regulations. The Land Use Law and Regulations are intended to preserve, protect, and encourage the development of lands in the State for those uses to which these lands are best

suited in the interest of public health and welfare of the people.

The Agricultural District category, within which the subject area is situated, includes those lands with a high capacity or potential for agricultural uses. It also includes lands surrounded by or contiguous to agricultural lands and which are not suited to agricultural and ancillary activities by reason of topography, soils and other related characteristics. The subject area is largely covered by 'a'a lava from the 1955 flow, and is classified as Class VIII by the USDA Soil Conservation Service. This class of soils is the lowest in the Soil Conservation Service's rating system. The Land Study Bureau's Overall Capability Rating for these soils is Class "E" or "Very Poor". Although it is possible for some form agricultural activity to be conducted on these soils, as evidenced by the surrounding agricultural uses, it is determined that the use of this parcel for the proposed activities will not adversely affect the agricultural potential of the region, the island, and the State.

Further, the proposed use will not substantially alter or change the essential character of the land and its present use since the land has been established as a geothermal development site as a result of the test drilling which was conducted in 1976. Therefore, effects on agricultural production of the subject 4+ - acre site would be further mitigated. Should the proposed project prove to be successful, geothermal energy and its by-products could possibly have a positive impact on agricultural activities, and possibly even be able to service some urban-related needs. The geothermal water could be used for agricultural irrigation, and the by-products of the geothermal water could also be used for other agricultural purposes. It is therefore determined that the granting of this particular request also would not be in conflict with the State and County's agricultural policies. In fact, it may even further foster agricultural development in the general area.

2. That unusual conditions, trends, and needs have arisen since the district boundaries and regulation were established.

Electricity is the major form of energy utilized in Hawaii. Most of the electricity is obtained through the burning of imported oil. Nationally, for the remainder of

the 20th Century, most of the energy demand will be met with fossil fuels and nuclear fission. In turn, fossil fuels are fast becoming a scarce world commodity due to increasing demand. Hawaii is currently most vulnerable to dislocations in the global oil market, but is also endowed with a variety of natural energy resource alternatives which are renewable or inexhaustible and potentially low polluting. Hawaii's near total dependence on imported petroleum provides the incentive for the promotion of energy conservation and the development of technology to harness local natural energy resources, such as geothermal. Therefore, the primary goal of the County of Hawaii relative to energy is "Energy self-sufficiency". It is felt that we must strive to attain energy self-sufficiency in order to minimize the dependence on imported fossil fuels. A commitment must be made by both the government and the public for research, planning, and development to attain the goal of energy self-sufficiency. In doing so, the County as well as the entire State would be benefited.

As a result of the 1974 oil crisis, there has been concern over Hawaii's dependence on imported petroleum. Recognizing this concern, the Hawaii County General Plan has stated as a policy that the "County shall encourage the continuation of studies concerning the development of power which can be distributed at lower costs to consumers." Further, the State Legislature has since then enacted several significant bills which were designed to promote the research and development of natural energy resources, and the conservation of energy in order to foster a greater independence from imported fossil fuels. However, prior to 1974, the Hawaii Geothermal Project (HGP), which is a cooperative project involving Federal, State, County and private funds, was organized to investigate the development of geothermal energy. The subject property was selected as a test site. In April 1976, a successful well was drilled and completed, and as a result, HGP has proposed the installation of a research power plant to demonstrate that geothermal energy is an economically viable natural energy alternative.

The nation is embarking on an aggressive program to develop its indigenous resources of geothermal energy. For over a decade, geothermal energy has been proclaimed as one of the more promising forms of alternate energy supply. It has been the County and State's policy to

encourage the development of alternative energy power. Both levels of government, as well as the Federal Government, has provided substantial funding and services for energy resource research and development to reduce the State's dependence on imported fuels. The island of Hawaii is believed to possess a vast resource base of geothermal heat. The test drilling at this site demonstrated the existence of a valuable geothermal energy source. However, the extent and magnitude of geothermal resources in Hawaii must still be determined. There is no way of knowing if the island actually has a geothermal resource of economic importance unless further testing is conducted. As a potential power source, geothermal may either prove to be of major importance or no importance at all. Only by further testing can this uncertainty be resolved. It is from these exploratory projects that data for evaluating the suitability of the resources as a production reservoir are obtained. Therefore, by allowing the proposed use, we would also be in the direction of fulfilling the County's goal of encouraging and supporting the expansion of the research and development industry. The development of geothermal power could bring the County closer to becoming a scientific model as articulated under the Economic Element of the General Plan.

Geothermal energy source could have tremendous benefits for people of this County as well as the rest of the State. Aside from providing power, the successfulness of the geothermal project can also be a major factor in accomplishing several other goals. A reduction in the County's current high cost of energy could aid existing industries as well as possibly attract new endeavors. Should the project prove successful, it can open the doors for economic development of a nature and magnitude beyond the realm of reality a few years ago. The success of geothermal energy could possibly stimulate economic activity which would provide new employment opportunities for the residents of the County. New industries, such as the mining and processing of manganese nodules, will be attracted into the area in the event that large amounts of power become available. These industries would provide job opportunities for construction, operation and other essential services. Thus, if the source of geothermal energy is successful and properly developed, it will be of great importance and benefit to the future of Hawaii.

By allowing the proposed use, we will be in the direction of fulfilling the goals of the General Plan's Public Utilities element of "ensuring that adequate, efficient and dependable public utility service will be available to users", and

"Maximizing efficiency and economy in the provision of public utility services".

It is therefore felt that the granting of the subject request at its particular location would be in the direction of fulfilling the County's General Plan's goals and policies, as well as that of the State Land Use Law and Regulations relative to providing for the public's welfare.

3. Although it has been pointed out that the proposed use of the land for its intended purpose may have some adverse effects, such as problems of noise and fumes, to the surrounding property and the residents in the immediate area, stringent controls and conditions will be attached to this Special Permit in order that the concerns may be alleviated. The petitioner will be required to comply with all applicable requirements of the State of Hawaii Department of Health.

Finally, we are cognizant of the fact, that the granting of this particular Special Permit may lead to similar types of requests. As such, it should be pointed out that we are working on a policy of such exploratory programs to minimize rampant development of test sites. The qualification of our favorable recommendation to allow the petitioner to proceed with this development is that the total project shall be closely monitored and the petitioner will be held accountable to stringent standards to insure minimal damage to our environment. We are cognizant of the possible dangers to health of residents in the area, and as stated earlier, will require preventative measures as conditions of approval of the Special Permit.

At this time, it should be pointed out that as part of the County's General Plan Update Program, the Planning Department has drafted a new Energy element for inclusion in the General Plan document. Certain goals and policies relative to the development of Geothermal and other energy resources are being proposed.

The favorable recommendation was also subject to the following conditions:

1. That the landowner, Kapoho Land Development Co., or its authorized representative shall submit a subdivision plan and receive tentative approval within one (1) year from the effective date of the Special Permit. The landowner/representative shall also be responsible for securing final subdivision approval.

2. That plans for Plan Approval be submitted within two (2) years from the effective date of approval of the Special Permit.
3. That construction of the proposed facility commence within one (1) year from the effective date of receipt of final Plan Approval and be completed within three (3) years thereafter.
4. That a landscaping buffer or screening zone be provided along the main highway fronting the subject property. The landscaping plans shall be submitted to the Planning Department for review and approval at the time of Plan Approval.
5. That the rules, regulations, and requirements of the State Department of Health shall be complied with.
6. That the petitioner or its authorized representative shall be responsible in assuring that every precaution is taken to reduce any nuisances, whether it be noise or fumes, which may affect the residents and properties in the immediate area. Should it be determined by the Planning Director that these precautionary measures are not being applied, he will prepare and present a written report to the Planning Commission for its appropriate action which may involve the termination of the Special Permit.
7. That the requirements of the County Grading Ordinance shall be complied with.
8. That should any unanticipated archaeological or historical sites be found on the subject property, the petitioner/representative shall immediately notify the Planning Department and cease operation until a clearance to recommence work is given by the Department.
9. That upon termination of the operation or if the petitioner determined that the project is not feasible, all structures erected shall be dismantled and removed from the site.
10. That only a maximum of two (2) accesses shall be permitted from the main highway meeting with the approval of the Chief Engineer of the County Department of Public Works.

Mr. Gordan Furutani
Page 7

11. That all other applicable rules and regulations shall be complied with.

Failure to comply with any of the delineated conditions of approval, particularly those relating to time commencement and expiration, shall be reason for termination of the Special Permit. Also, requests for any time extension filed after the stipulated commencement or expiration dates shall not be approved.

Enclosed are copies of the Exhibits from the subject docket.

Sincerely,



WILLIAM F. MIELCKE
Chairman, Planning Commission

lgv

Enclosures

cc Mr. Hideto Kono, Director, DPED
Land Use Division, DPED
Mr. Jack Keppeler, Managing Director, County of Hawaii
Mr. Bill Chen, DPED Consultant

COPY

PLANNING DEPARTMENT
25 AUPUNI STREET

COUNTY OF HAWAII
HILO, HAWAII 96720

June 7, 1978

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
Tax Map Key 1-4-01:portion of 2

The Planning Commission at its regular meeting of June 1, 1978, considered your application for a special permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District at Kapoho, Puna, Hawaii.

The Commission voted to forward a favorable recommendation to the Land Use Commission subject to the following conditions:

1. That the landowner, Kapoho Land Development Co., or its authorized representative shall submit a subdivision plan and receive tentative approval within one (1) year from the effective date of the Special Permit. The landowner/representative shall also be responsible for securing final subdivision approval.
2. That plans for Plan Approval be submitted within two (2) years from the effective date of approval of the Special Permit.
3. That construction of the proposed facility commence within one (1) year from the effective date of receipt of final Plan Approval and be completed within three (3) years thereafter.

4. That a landscaping buffer or screening zone be provided along the main highway fronting the subject property. The landscaping plans shall be submitted to the Planning Department for review and approval at the time of Plan Approval.
5. That the rules, regulations, and requirements of the State Department of Health shall be complied with.
6. That the petitioner or its authorized representative shall be responsible in assuring that every precaution is taken to reduce any nuisances, whether it be noise or fumes, which may affect the residents and properties in the immediate area. Should it be determined by the Planning Director that these precautionary measures are not being applied, he will prepare and present a written report to the Planning Commission for its appropriate action which may involve the termination of the Special Permit.
7. That the requirements of the County Grading Ordinance shall be complied with.
8. That should any unanticipated archaeological or historical sites be found on the subject property, the petitioner/representative shall immediately notify the Planning Department and cease operation until a clearance to recommence work is given by the Department.
9. That upon termination of the operation or if the petitioner determined that the project is not feasible, all structures erected shall be dismantled and removed from the site.
10. That only a maximum of two (2) accesses shall be permitted from the main highway meeting with the approval of the Chief Engineer of the County Department of Public Works.
11. That all other applicable rules and regulations shall be complied with.

Failure to comply with any of the delineated conditions of approval, particularly those relating to time commencement and expiration, shall be reason for termination of the Special Permit. Also, requests for any time extension filed after the stipulated commencement or expiration dates shall not be approved.

Mr. Hideto Kono
June 7, 1978
Page 3

In the meantime, should you have any questions, please
feel free to contact the Planning Department at 961-8288.

Sincerely,



WILLIAM F. MIELCKE
Chairman, Planning Commission

lgv

cc ✓ State Land Use Commission
Land Use Division, DPED
Mr. Jack Keppeler, Managing Director, County of Hawaii
Mr. Bill Chen, DPED Consultant

LIST OF EXHIBITS - STATE OF HAWAII DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

- A. Letter from the applicant (11/16/77)
- A-1. Application form
- A-2. Letter of Authorization from Kapoho Land Co.
- A-3. Applicant's USGS location map
- A-4. Applicant's Tax Map project site
- A-5. Applicant's Plot Plan of existing facilities
- A-6. Applicant's proposed development plan and description of proposed facilities
- A-7. Applicant's Reasons
- A-8. Applicant's Preliminary draft EIS
- A-9. Applicant's selected excerpts from Proposal to the Energy Research and Development Administration
- A-10. Applicant's filing fee
- B. Departmental acknowledgement letter (12/2/77)
- C. Memo to agencies (12/2/77)
- D. Water Supply (12/7/77)
- E. Applicant's Status report (12/9/77)
- E-1. Applicant's status report
- F. Police (12/12/77)
- G. Highways, DOT (12/12/77)
- H. Agriculture (12/12/77)
- I. Transmittal from Soil Conservation Service (SCS)(12/14/77)
- I-1. SCS Report (12/14/77)
- I-2. SCS map
- J. Public Works (12/14/77)
- K. Health (12/19/77)
- L. Fire (12/19/77)
- M. R & D (12/20/77)

N. Helco (12/18/77)

O. Letter from the applicant (12/28/77)

P. Letter to the applicant (1/18/78)

Q. Letter from the Office of Environmental Quality Commission (OEQC) (1/20/78)

R. Letter from the applicant (1/23/78)

S. Memo to agencies on copy of draft EIS

T. Public Works (1/30/78)

U. Water Supply (2/2/78)

V. Health (2/7/78)

W. Letter sent to surrounding property owners (2/7/78)

W-1. Map sent to surrounding property owners

W-2. List of surrounding property owners

X. Letter to the applicant (2/7/78)

X-1. Public Hearing Notice

Y. Transmittal from SCS (2/8/78)

Y-1. SCS report (1/31/78)

Z. Water Supply (2/8/78)

AA. Agriculture (2/14/78)

BB. R & D (2/14/78)

CC. Highways, DOT (2/15/78)

DD. Letter to OEQC (2/12/78)

EE. List of Witnesses

EE-1. Testimony of Hideto Kono, Dir. DPED

EE-2. Testimony of Jack Keppeler, Mgr. Dir., County of Hawaii

FF. Voting Sheet - continue public hearing

GG. Minutes 2/23/78

HH. Transcript 2/23/78

II. Letter to the application (2/24/78)

JJ. Letter from the applicant (3/15/78)

KK. Letter to the applicant (3/22/78)
LL. Letter from the applicant (3/30/78)
MM. Letter to the applicant (4/7/78)
NN. Letter from the applicant (4/14/78)
NN-1. Applicant's conceptual drawing
NN-2. Applicant's proposed uses at the project site
OO. Letter to the applicant (4/12/78)
PP. Letter sent to the Surrounding property owners (4/14/78)
QQ. Letter to the applicant (4/14/78)
QQ-2. Public Hearing Notice
RR. Letter from the applicant (4/14/78)
RR-1. Letter from Governor Ariyoshi approving EIS (4/12/78)
RR-2. Revised EIS
SS. Letter to the applicant (4/20/78)
TT. Minutes 4/27/78
UU. Transcript 4/27/78
VV. Letter to the applicant (4/28/78)
WW. Letter to the applicant (5/18/78)
XX. -----
YY. -----
ZZ. Letter from DAGS (5/19/78)
ZZ-1. DAGS proposed Hawaii Geothermal Research Station
AAA. Staff Background 2/23/78
BBB. Staff Background 4/27/78
CCC. Staff Recommendation 6/1/78
DDD. Location Map(please return)
EEE. Voting Sheet - Recommend approval to LUC
FFF. Minutes 6/1/78



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

November 16, 1977

Mr. Sidney Fuke
Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Special Permit for HGP-A Geothermal Research Facility at
Puna, Hawaii TMK: 1-4-01: 2 por.

Dear Mr. Fuke:

Enclosed is the Department of Planning and Economic Development's Special Permit Application for the subject project. In accordance with the Planning Department's Filing Procedure for Special Permits, the following items are included:

1. 16 copies of the completed application form (Exh. 1)
2. 16 copies of the letter of authorization from the Kapoho Land Company (Exh. 2)
3. 16 copies of the U.S.G.S. location map for the project (Exh. 3)
4. 16 copies of the Tax Map of the project site (Exh. 4)
5. 16 copies of plot plan of existing facilities (Exh. 5)
6. 16 copies of the proposed development plan and description of the proposed facilities (Exh. 6)
7. 16 copies of the Reasons for the Special Permit Request (Exh. 7)
8. 16 copies of the preliminary Draft EIS for the project (Exh. 8)
9. 16 copies of selected excerpts from the Proposal to the Energy Research and Development Administration (Exh. 9)
10. \$100 Filing Fee (Purchase Order No. 001814)

We would appreciate your earliest consideration of our request.

If you have any questions regarding the application, please contact our Land Use Division at 548-2061.

Sincerely yours,

HIDETO KONO
Director

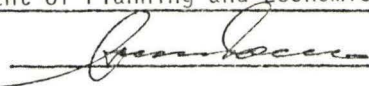
EXHIBIT A

Enclosures

APPLICATION FOR SPECIAL PERMIT

COUNTY OF HAWAII

PLANNING DEPARTMENT - PLANNING COMMISSION

APPLICANT: Department of Planning and Economic Development
APPLICANT'S SIGNATURE:  (Hideto Kono)
ADDRESS: P. O. Box 2359, 250 South King Street
Honolulu, Hawaii 96804
TELEPHONE: 548-2483
TAX MAP KEY: TMK: 1-4-01:2 (portion) AREA: 4 acres
(Size of Parcel)
OWNER: Kapoho Land and Development Co.
OWNER'S SIGNATURE: _____
APPLICANT'S INTEREST, IF NOT OWNER: Lessee
REQUESTED USE: To install a geothermal research facility and to run
flow tests on HGP-A.

APPLICANT'S REASON(S) FOR REQUESTING SPECIAL PERMIT: *(Please attach)*

NOTE: The applicant must show that:

- (a) such use shall not be contrary to the objectives sought to be accomplished by the Land Use Law and Regulations;
- (b) the desired use shall not adversely affect surrounding properties;
- (c) such use shall not unreasonably burden public agencies to provide roads and streets, sewers, water, drainage, school improvements, and police and fire protection;
- (d) unusual conditions, trends, and needs have arisen since the district boundaries and regulations were established;
- (e) the land upon which the proposed use is sought is unsuited for the uses permitted within the district;
- (f) the proposed use will not substantially alter or change the essential character of the land and the present use; and
- (g) the proposed use will make the highest and best use of the land involved for the public welfare.

THIS APPLICATION MUST BE ACCOMPANIED BY:

- (a) 16 copies of the completed application form with attachments.
- (b) 16 copies of a location map.
- (c) 16 copies of a site plan with existing and proposed uses.
- (d) any additional information.
- (e) \$100.00 processing fee.

For Official Use:

Date received _____
120th day _____
Public Hearing date _____
Action date _____
To Land Use Commission _____

EXHIBIT A-1



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

August 5, 1977

Mr. Richard Lyman, Jr.
Kapoho Land & Development Co., Ltd.
P. O. Box 374
Hilo, Hawaii 96720

Dear Mr. Lyman:

As you know, the HGP-A Development Group is planning to install a wellhead generator at the HGP-A test well site located at Kapoho, Puna, Hawaii, TMK: 1-4-01: 2 (por.) on property owned by the Kapoho Land and Development Co., Ltd. The installation of the wellhead generator and related facilities will permit the generation of electricity at the site.

Prior to being able to construct the facility, however, we must obtain a Special Use Permit, insofar as the property is located within the State Agricultural District and the proposed use is not a use normally permissible within this District.

As the lead agency in the HGP-A Development Group, the Department of Planning and Economic Development is presently in the process of preparing the Special Use Permit Application.

In order to facilitate the processing of this application, we are, by this letter, requesting your approval for the DPED to apply for a Special Use Permit on your behalf.

If you are in accord with this procedure, we would appreciate your signing and returning to us, the enclosed copy of this letter.

Thank you for your cooperation in this matter.

Sincerely,



Hideto Kono

Approved:


Kapoho Land & Development Co., Ltd.

Date: August 15, 1977

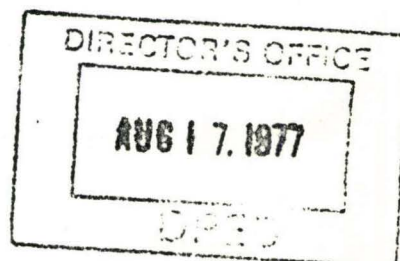


EXHIBIT A-2

EXHIBIT 2

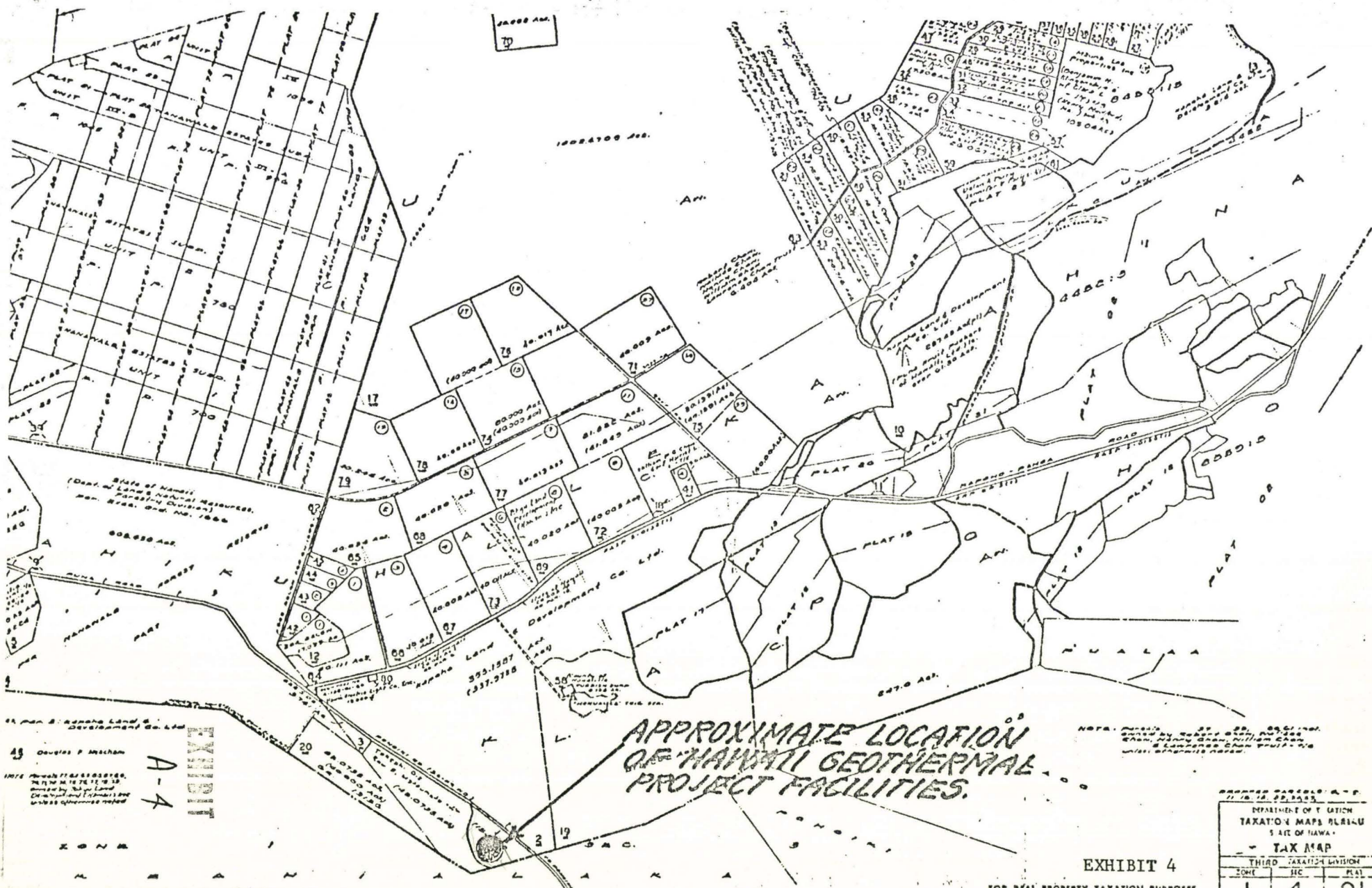


EXHIBIT 4

FOR REAL PROPERTY TAXATION PURPOSES
SUBJECT TO CHANGE

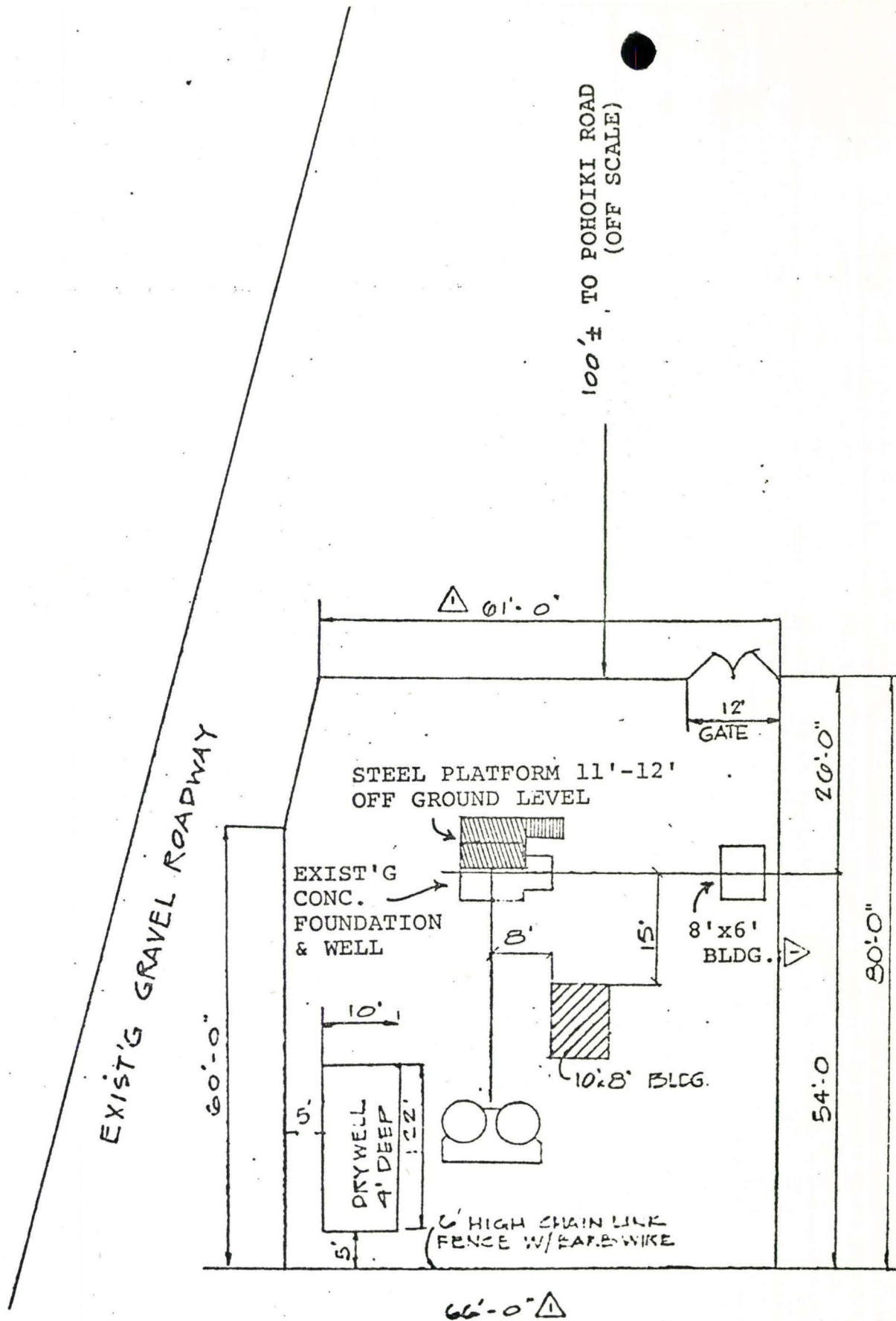
DEPARTMENT OF REVENUE
TAXATION MAPS BUREAU
STATE OF FLORIDA
- TAX MAP
THIRD TAXATION DIVISION
ZONE HC PLAT
1 4 01

Plot Plan of Existing Facilities

Site of HGP-A Geothermal Well

1. The 10' x 8' building is an instrument shed. Its height is 13'.
2. The 8' x 6' building is a shed to shelter workers when they are operating the winch. It is 6' high.
3. The silencers/separators are 17' high.
4. The purpose of the drywell is to drain excess fluid from the silencers/separators.

EXHIBIT A-5



PLOT PLAN.

SCALE 1"=20'

EXHIBIT a-5

N ↓

EXHIBIT 5



Figure 3-42. Hawaii Geothermal Res
EXHIBIT 6 Facility Plot Plan

Facilities Proposed for Hawaii Geothermal Research Station

1. Production Well HGP-A
2. Silencer
3. Drain Field
4. Steam-Water Separator
5. Demister
6. Turbine
7. Generator
- 8.a. Barometric condenser
- 8.b. Hot Well
9. Control Trailer and Motor Control Center (MCC)
10. Lube Cooler
11. Overhead Duct
12. Switchgear
13. Transformer
14. HV Switchgear Assembly
15. Load Banks
16. Lightning Arrestors
17. Instrument Air Compressor
- 18.a. Iron Catalyst Injection
- 18.b. Coagulant Aid Injection
19. Clarifier
20. Sludge Dryer, Compactor and Container Fill
- 21.a. Injection Well
- 21.b. Injection Pump
22. Cooling Towers
23. R&D Test Facility
24. Site Piping
25. Redwood Fencing
26. Roads, Parking and Security

Description of the Facilities Proposed for the Hawaii Geothermal Research Station

The Hawaii Geothermal Research Station will consist of the research power plant and a facility to do research and development of electric and non-electric applications of geothermal resources.

The research power plant will assist the development of geothermal energy in the State of Hawaii through the early demonstration of the generation of electricity from geothermal heat from a young volcanic geothermal reservoir. The project will assist the industrial sector in evaluating and establishing the operational risk levels associated with energy production from such a source, and help to determine the environmental constraints that may be associated with the long-term production of fluids from a typical volcanic geothermal reservoir.

The R&D test facility will consist of up to three test pads and pipes to supply the geothermal fluids to the test pads. The R&D of electric applications will include tests of concepts, hardware components, and sub-systems. A wide range of non-electric applications will be tested including agricultural applications, such as controlled-environment cultivation; industrial food-processing, such as canning, freeze-drying and processing fruit and fruit-juices; and aquaculture applications, such as raising nehu.

General Description

The 4-acre site divides naturally into an upper and lower portion of roughly two acres each. There is presently a plastic-lined water pond on the upper 2-acre portion, which was used to supply water during the drilling of HGP-A.

The general grade of the property appears to fall to the southwest and appears to be very porous and no drainage problems appear imminent. There are two ways that used fluid from the research station could be disposed of, namely, through a drainage pond or through a reinjection well. During the design phase of the project, both methods will be studied and a decision will be made. If a drainage pond is used, it will probably be excavated on the upper portion of the site, which will remain essentially undeveloped.

The facilities indicated in the attached plot plan (Figure 3-42) are located in an area approximately 200 feet by 400 feet running in a northeast direction from the Pohoiki Road, and completely surrounded by a security type chain-link fence. The redwood slatted cooling tower has been placed between the road and all of the equipment to present an esthetically pleasing appearance and to keep the tower downwind of the plant components to prevent water carry-over to the plant. The power plant, consisting of the turbo-generator, demister and barometric condenser, has been located close to the production well and steam separator to keep the insulated, large-size piping lengths as short as possible because of their high cost. Any objectionable noise from the existing silencer in the present location should be muffled from the populated areas by the cooling tower. The switch gear and transformer area is adjacent to the turbo-generator to reduce wire lengths and to take advantage of the adjacent location of the HELCO grid.

Description and Use of Proposed Facilities

It should be noted that the generator and associated equipment have yet to be selected, and there may be minor variations in the plot plan of the research station when the major items of equipment have been selected and the

design phase has been completed. It is anticipated that the design phase will be completed 12 months after the project's start date. Thus the facilities on the attached plot plan, that are described below, are those that are anticipated for the research station and they closely resemble the equipment that will eventually be installed, but some changes or modifications are probable.

1. Production Well HGP-A

HGP-A is the well drilled to 6,435 feet by the Hawaii Geothermal Project. The fluids from HGP-A will be used to run the turbo-generator system to produce electricity. HGP-A has tested out with temperatures in excess of 600 degrees Fahrenheit downhole, and a wellhead pressure between 50 and 350 p.s.i. This pressure is sufficient to power an electric generating unit of up to 3.5 megawatts. No more than two megawatts of electricity will be sold to Hawaii Electric Light Co., however, because the transmission line that runs by the HGP-A site cannot handle more than two additional megawatts of power.

Any electric power generated at the station in excess of two megawatts will either be utilized to experiment with electric applications in the R&D test facility or be dissipated in the station's resistive load banks. Valves, gauges, accessories and mounting equipment will be installed on the wellhead to control and monitor fluid flow.

2. Silencer

A silencer will muffle the noise that accompanies the release of geothermal fluids to the atmosphere to prevent a nuisance to the persons living in the vicinity and to protect the personnel working in the area.

3. Drain Field

The drain field is the existing pit into which geothermal fluids from the well are presently discharged. If a reinjection well is drilled or a new enlarged drainage pond is developed, this drain field will no longer be needed.

4. Steam-Water Separator

The function of the steam-water separator is to receive the two-phase fluid as it comes out of the wellhead and separate it into steam and water. The two-phase fluid enters the separator through a tangential inlet duct and by centrifugal action the water is separated at the walls and settles to the bottom of the vessel while the steam rises over a central pipe that serves to exhaust the steam. The liquid phase is exhausted from the vessel and sent to the drainage pond. This piece of equipment will be 25-30 feet high.

5. Demister

A demister is a cylindrical tank with an internal arrangement which promotes a centrifugal separation of particles. The function of the demister is to remove entrained water droplets from the steam, before it enters the turbine. Steam coming from the steam/water separator contains minute quantities of water and dissolved solids. If these droplets are permitted to enter the turbine they will cause erosion and corrosion problems that will reduce the life of the blades and cause shutdowns and costly maintenance problems. The demister will reduce the moisture content of the steam to a level that can be tolerated by the turbine for long-term operation.

6. Turbine

A condensing turbine will be used in which the steam expands in several stages and supplies shaft power to an electric generator. The turbine will be a 20 to 25-foot high structure.

7. Generator

The generator transforms the mechanical energy from the turbine into electrical energy.

8.a. Barometric condenser and 8.b. Hot Well

The function of the condenser subsystem is to condense the vapor exhausting from a turbine and reduce the back pressure on the last stage. To accomplish this it is necessary not only to condense the water vapor but also to remove the non-condensable gases that accompany geothermal steam. The condenser subsystem therefore consists of a condenser, steam eductors to remove non-condensables, and water supply and pumps.

9. Control Trailer and Motor Control Center (MCC)

These are two transportable 8'x8'x24' building modules adjacent to the turbo-generator which house the motor control center and office for the power plant. This building has been isolated from the other support buildings because of the separate function and operation of the power plant.

10. Lube Cooler

This piece of equipment cools off the lubricants for machine bearings.

11. Overhead Duct

The function of the overhead duct is to house the insulated conductors which serve as a feeder from the generator to the substation. The feeders from the substation to the station service transformers will be conductors routed in a similar fashion.

12. Switchgear

The generator and low voltage switchgear protects and separates the generator from the transformer. It also supplies the plant with all the low voltage power needed.

13. Transformer

The transformer steps up the low voltage power from the generator to HELCO transmission voltage.

14. HV Switchgear Assembly

The high voltage switchgear assembly protects and separates the transformer from the HELCO system.

15. Load Banks

These load banks will dissipate any excess power generated from the generator system which cannot be transmitted.

16. Lightning Arrestors

These prevent lightning from damaging the facilities and equipment on the power plant site.

17. Instrument Air Compressor

The air compressor system provides compressed air as needed for instrumentation.

18.a. Iron Catalyst Injection and 18.b Coagulant Aid Injection

The iron catalyst system is an H_2S abatement system which includes the catalyst injection system, the clarifier, transfer pumps, the flocculator/clarifier, and the sludge handling system. The catalyst injection system injects ferric ions (via ferric sulfate) into the cooling water in the cooling towers. The ferric ions react with the dissolved H_2S to yield elemental sulfur, water and ferrous ions. As the cooling water is aerated in the cooling tower, the ferrous ions react with oxygen to reform ferric ions thus providing continuous regeneration of ferric ions to sustain the H_2S reactions which repeat continuously to yield sulfur. The sulfur thus formed is removed from the system via clarifiers (after flocculation) as a sludge and disposed of in accordance

with County regulations. A maximum of 1000 lbs. per day of sulfur will be produced.

19. Clarifier

The clarifier is a partially buried, pre-assembled steel tank in close proximity to the injection pumps and well, and also close to the clarifier sludge handling system located on the access road for easy removal of the sludge.

20. Sludge Dryer, Compactor and Container Fill

See "Iron Catalyst Injection" above.

21.a. Injection Well and 21.b. Injection Pump (Not in current planning)

The injection well and injection pump are used to reinject all geothermal fluids extracted from the resource less those used for research and demonstration applications or evaporated in the cooling tower.

22. Cooling Towers

The function of the cooling tower is to provide the water required to condense the vapor that is exhausted from the turbine, and the vapor that enters the interstage condensers of multiple stage gas ejectors. This is accomplished by cooling the water, including the condensate, from the condensation temperature (115°F) to the condenser feed water temperature (85°F). The cooling is done by the evaporation of water which occurs when air is passed through a curtain of falling condensate/cooling water. Cooling towers will be the most visible pieces of equipment at the research station because of their relatively large size.

The cooling tower depicted in the plot plan is composed of three modules, each of which is 60.5 by 29 feet, 18 feet high, and sits in a concrete basin 1.5 feet deep. Another type of cooling tower that could be utilized is a 36-foot square unit within a total height of 53 feet.

The water which will be used for the initial fill of the cooling tower system and used for the make-up of the cooling tower will be water that is produced by the existing production well in the form of condensation from the separator and from the turbine generator. Because the geothermal water analysis indicates that the water has a relatively low concentration of salts or other impurities (other than the H_2S), the geothermal water will be more than satisfactory for the cooling systems and any search for additional or alternate sources of cooling water is not necessary.

23. R&D Test Facility

The research test facility will be designed to accommodate experiments in electric and non-electric applications in support of local, State, and national needs to develop and utilize geothermal energy. The test facility will consist of up to three test pads, one of which will be designed specifically to test energy conversion systems. The test pads will have concrete floors and each pad will be approximately 35 feet square. All test pads will be supplied with three geothermal fluid types (steam, hot brine, and a bi-phase mixture of steam and saturated water) for optional use by experimenters. In addition, electrical services, cooling water and compressed air will be provided to the test pads, as will instrumentation to monitor the temperature, pressure and flow of the geothermal fluids.

The test pads will be covered by a roof to protect the test equipment from the rain.

24. Site Piping

Piping will be routed throughout the site on elevated pipeways. Pipe, pipe supports, and pipeway structures will be designed and painted and coded in such a manner as to permit efficient maintenance procedures.

Lines carrying hot fluids will be insulated for both personnel protection and heat conservation. Expansion joints or expansion loops and pipe anchors will be utilized where required. Vibration isolators will be used on pumps and air compressors. Bypasses and flanged connections will be used on control valves, flow orifices, and other equipment where frequent calibration or maintenance may be required.

25. Louvered Redwood Fencing

Slatted redwood architectural screens and selected plants will be placed around the site of the research power plant to mask the industrial appearance of the equipment.

26. Roads, Parking and Security

The access road and plant roads will be designed to handle the legal maximum length for highways of semi-trailers (55 feet).

Parking will be provided in close proximity to each of the operating functions of the research facility, as indicated in the plot plan. Parking areas and roads will be paved.

In addition to the entire area being surrounded with a fence, the switchgear yard and the maintenance and work yard are further protected with an 8-foot chain-link fence and barbed wire.

Reasons for the Special Use Permit Request

The Department of Planning and Economic Development, as the lead agency for the HGP-A Development Group, is hereby applying for a special use permit on behalf of Kapoho Land and Development Company for a 4.1-acre parcel of land, site of the geothermal well, called "HGP-A," in the Puna District of the Island of Hawaii (TMK 1-4-01:2 (por.)), for the following uses:

- (1) to run flow tests, described below in Section I, to learn more about the special characteristics of the HGP-A well and the Kapoho Reservoir,
- (2) to install a geothermal research facility, the Hawaii Geothermal Research Station, described in Exhibit 6 of this Special Use Permit, to include (a) a power generation system and associated equipment (silencers, separators and cooling towers) and (b) a research facility to test electric and non-electric applications of geothermal resources, and
- (3) to use the power plant and research facility, which should be in place two years after the project's start date, as described below in Section II.

The subject property lies within the State Agricultural District and is designated in the General Plan Land Use Pattern Allocation Guide Map as Orchard, and zoned Ag-1. An application will be submitted to the County of Hawaii Planning Department to subdivide the parcel of which the subject property is a portion, and a lease for the property is currently being negotiated between the Department of Land and Natural Resources and the owner, Kapoho Land and Development Co.

EXHIBIT *Q-7*

The Special Use Permit is requested because, even though the project is an unusual use of agriculturally classified land, it is a reasonable use that will have a minimal effect on the surrounding lands (see Exhibit 8, the draft Environmental Impact Statement for the project), and, most importantly, the permit is requested because a successful demonstration of geothermal resources for energy and other applications will hasten the overall development of geothermal energy in the Puna District, which will be of great benefit to the County of Hawaii, and, more generally, to the State of Hawaii and all of its people.

The rapid development of geothermal energy in Puna requires a positive confirmation that the Kapoho Reservoir tapped by HGP-A has an energy potential of the magnitude that has been attributed to it by scientists at the Hawaii Institute of Geophysics (500 MW for 100 years). Therefore a further assessment of the reservoir is needed, and the Hawaii Geothermal Project anticipates conducting a reservoir assessment project, under a separate Federal grant for this purpose. Thus while the reservoir assessment is needed prior to development of the field, and will be conducted in cooperation with the Hawaii Geothermal Research Station project--the subject of this Special Use Permit--it will be a separate project and apply for any permits required separately. The reservoir assessment project will require one or two step-out wells to HGP-A. A step-out well is a well drilled in relation to another well (usually within a 2,000 ft. circumference) so that tests on one well will contribute data on the other well and the reservoir that they both tap into. One or more of the step-out wells required for assessing the reservoir may be drilled by GEDCO, a private company which plans to drill a step-out well to HGP-A within a year. GEDCO is preparing a separate special use permit for their step-out wells.

The Hawaii Geothermal Research Station will be designed and constructed by a Systems Integration Contractor to be selected by the HGP-A Development Group. The Development Group, which is made up of representatives of the State of Hawaii, the County of Hawaii, the University of Hawaii, and the Hawaii Electric Light Co., was formed to accomplish this project. It is anticipated that the project will be funded with 80-90 percent Federal funds, a State of Hawaii contribution of \$400,000, and a County of Hawaii contribution of \$100,000.

I. HGP-A Flow Tests

Selection of the turbine generator and associated equipment suitable for the particular composition of geothermal fluids from HGP-A will require further well testing. It is, therefore, anticipated that short- and long-term flow tests will be conducted prior to and during the construction of the wellhead generator system. During different phases of the project, the following flow tests can be anticipated:

- (a) Period from the award of permit to the initiation of construction phase.

A series of short-term flow tests will be necessary to collect and confirm information for the design of the wellhead turbine generator. The information required includes fluid chemistry, composition of non-condensable gases, fluid heat content, orifice plate size limits, control valve specifications, corrosion samples, reservoir production layers, etc.

The flow tests will be limited to no more than 8 hours per 24-hour period, and will usually be for fewer than 8 hours. They will be conducted between 7 a.m. and 7 p.m. when few persons

living in the surrounding area are at home. The tests will be conducted with the existing silencing equipment. A maximum of 20 such tests are anticipated, and as few as half that number may be required.

- (b) Period during the construction (a nine-month construction period is anticipated).

A series of equipment shakedown tests will be conducted during the construction of various components of the wellhead turbine generator system. The tests will be limited to no more than 8 hours per 24-hour period prior to the installation of more effective equipment to control noise and odor. They will be further limited to between 7 a.m. and 7 p.m. If, however, the odor and noise control systems are installed (they could be in place within a year and a half of the project start date), the flow tests may be continuous for as long as the shakedown tests require.

- (c) Period after effective noise and odor control systems are installed, but prior to the completion of the total turbine generator system.

Long-term flow tests may be initiated to evaluate the Kapoho geothermal anomaly and to conduct interference tests when other wells adjacent to the HGP-A are completed. The flow tests will be continuous on a 24-hour per day basis for as long as needed.

II. Use of the Hawaii Geothermal Research Station

The HGP-A Development Group plans to have the HGP-A well producing electricity at an early date to demonstrate that geothermal energy is presently an economically viable energy alternative for the Big Island.

The successful generation of electricity with geothermal energy from HGP-A will help to persuade the utility to consider using this energy resource for the growing energy needs of the Big Island, instead of constructing additional oil-fueled generating plants. As previously stated, the target date for completion of the power plant is two years after the project's start date.

It is estimated that HGP-A can produce up to 3.5 megawatts of electricity, of which HELCO has agreed to purchase 1.5 to 2 megawatts. The remaining electricity will be used for experimental purposes in the Station's R&D facility or dissipated in the resistive load banks.

It is the intention of the HGP-A Development Group to sell the electricity to the utility, but this use requested for the property is nevertheless for research rather than commercial purposes because the objective is to gain experience with the engineering and financial factors involved in producing electricity from a young volcanic reservoir.

HELCO has stated that they will pay for electricity generated from geothermal steam from HGP-A at a rate equal to HELCO's average cost of energy per net kilowatt hour generated and purchased, or, in other words, approximately \$200,000 to \$260,000 per year for 1.5 to 2 megawatts of electricity. HELCO estimates that operating expenses (labor and supplies) for the power plant will be about \$150,000.

The current expectation is that the R&D facility for experimenting with electric and non-electric applications of geothermal resources will be built largely with State funds, although some Federal funds may be available for the facility and the research projects conducted there.

The Hawaii Geothermal Research Station is a research project that has received and will continue to receive substantial public funding support because it is in the public interest to hasten the development of geothermal energy in the County of Hawaii.

III. Reasons for the Special Use Request

The reasons for granting permission for this special use are that it will be in compliance with the requirements stated as special use permit guidelines, as follows:

- (a) The proposed use would not be contrary to the objectives sought to be accomplished by the State Land Use Law and Regulations. The State Land Use Law and Regulations are intended to preserve, protect and encourage the development of lands in the State for those uses to which these lands are best suited in the interest of public health and welfare.

The area under consideration is classified as Agricultural by the State Land Use Commission. However, the Agricultural district classification includes lands surrounded by or contiguous to agricultural lands which are not suited to agricultural and ancillary activities by reason of topography, soil and other related characteristics, as in the case of the subject property. The subject property is largely covered by a'a lava from the 1955 lava flow and the property's dominant soil type is a'a lava, which is in the USDA, Soil Conservation Service's capability Class VIII. Class VIII soils have severe limitations that preclude their use for commercial plants. This class is

the lowest in the Soil Conservation Service's ranking system for agricultural activity. The Land Study Bureau's rating for this land for overall agricultural productivity is also very poor as they are classified as Class "E."

Further, the use of the subject property for non-agricultural purposes is not expected to have any adverse effect on the overall agricultural potential of the region of the County and State as the land is not presently being used for any agricultural activity.

- (b) When the Hawaii Geothermal Research Station (the power plant and the R&D facility) is in place, there will be no adverse effect on surrounding properties because the power plant will muffle the noise that is currently experienced when steam is released from the well and the H₂S abatement equipment will almost totally eliminate H₂S from being released into the atmosphere. Thus when the facility is completed, the noise and hydrogen sulfide problems will be mitigated, and the major nuisance effect will be visual. It will be possible to see the Station's cooling towers from Pohoiki Road. The cooling towers will be 25 - 30 ft. from the road and could be as high as 53 ft. (see Exhibit 6 for a description of the towers). A redwood fence will surround the Station, and it too will be visible from the road. Because of the size of the cooling towers, they will prevent the Station's other facilities from being seen from the road. The towers will be painted to blend

in as much as possible with the landscape, and plants and foliage will be used to make the area more visually attractive.

The flow tests that are proposed prior to the installation of noise and odor control systems will, admittedly, result in increased noise and sulfur levels in the surrounding area. But the tests will be run as previously described for only short periods during the day to minimize the nuisance effect. Only a dozen families presently live within a mile radius of the well, and this type of well-testing has not caused them undue hardship in tests conducted to date. Once the turbine generator and scrubber are in place, the noise will be muffled, and the hydrogen sulfide (H_2S) scrubbed from the geothermal fluids, so that the impact on the surrounding properties will be minimal.

- (c) The proposed use will not unreasonably burden public agencies to provide any roads or streets, sewers, water, drainage, school improvements, or police and fire protection. The existing road to the site is adequate for the project's requirements. The Pahoa-Pohoiki Road, which forms one boundary of the well site and is approximately 300 feet from the wellhead, connects Highway 132 to the coast. Highway 132 is a two-lane, paved, all-weather highway that was able to accommodate without difficulty the drilling rig, supplies and support equipment used in drilling HGP-A. A maximum of 15 men are anticipated

to be working on the site at any one time, and they will not require public provision of any additional infrastructure or police and fire protection.

It is anticipated that the water and sewage requirements for the small number of persons using the research facility will be met with a catchment system and a cesspool. When the power plant has been installed, it will be largely automated. The research facility for experimenting with electric and non-electric applications will have a varying number of persons using the facility, but these should not exceed a maximum of ten.

- (d) Unusual conditions, trends, and needs have arisen since the district boundaries and regulations were established. Before HGP-A was drilled and tested in 1976, the existence of a vast exploitable geothermal reservoir--the Kapoho Geothermal Reservoir--was unknown. The well was drilled in a spot deemed by Hawaii Geothermal Project researchers, geologists and consultants, to be the most promising candidate for exploration--but the expectation was that the well would probably be a research rather than a producing well. The extent of the reservoir has been estimated at having a subsurface area of two square kilometers, a subsurface volume of four cubic kilometers, and heat content of 9.3×10^{18} calories. Exploitation of geothermal resources is not an incompatible use with agriculture, as in many areas of the world geothermal

and agricultural uses exist side-by-side. For example, in Lardello, Italy, vineyards are side-by-side to producing geothermal wells, with vines growing within 10-15 feet of a well. As already noted, the subject property is not suitable for many agricultural purposes, but over and above these considerations, the discovery of exploitable geothermal resources in the area does constitute an unusual condition that is appropriate grounds for granting a special use permit.

- (e) As previously stated, the land for which the proposed use is sought is poorly suited for agriculture as the well site is an exposed lava flow--from 1955. The undisturbed part of the flow consists of barren a'a, covered by a dense growth of lichens, with scattered ferns and ohia lehua. This type of land can be used for only a very limited number of agricultural uses, such as papaya orchards and growing ornamental plants.

While the construction of a geothermal research facility on the 4.1-acre parcel in question will preclude its use for some permissible uses, it will not prevent the surrounding properties from being so used. Far from reducing the value

of agricultural lands in Puna, the project is intended to add to their economic potential. It is anticipated that geothermal heat, steam and water from the well will be used to experiment with non-electric agricultural applications which could include industrial food processing of fruit and fruit juices, and use of geothermal water for agriculture and agricultural processes.

- (f) The proposed use of the subject property will not substantially alter or change the essential character of the land, as even full-scale development of geothermal resources in the Puna District--which would have a far greater impact than the project which is the subject of this application--would only occupy and alter a small percentage of the total surface of developed land. The balance of the land within the area developed for recovery of geothermal resources would remain as it is now and would be suitable for the uses designated in the land use laws and regulations, at least to the extent it is now useful for these purposes.

As has been discussed above, it is the nature of geothermal development, in the active fields worldwide, that agricultural operations can continue in about the same form as they did, or

would have, were geothermal resources not being taken from the area. If anything is changed, it is usually to initiate an improvement over previous possibilities in the same area.

Since presently the land has only the well, silencers, a drainage pit, some ancillary shed-type buildings, and a 6-foot-high chain link fence topped with barbed wire, the construction of a geothermal power plant and research station will change the present use of the land. It should be noted, however, that the main character of the land was altered when the well was drilled on a previously untouched site and the further alteration presently proposed will not be a substantial change.

- (g) The proposed use is the highest and best use of the land involved for the public welfare. The proposed geothermal power plant will supply two megawatts of electricity which will be purchased by the Hawaii Electric Light Co. within approximately two years of the initiation of the project, and the proposed research facility will provide the geothermal steam and water to experiment with non-electric applications that will benefit agriculture and other industrial development in the area.

Moreover the expanded development of geothermal resources in the Puna District beyond this particular well would provide even greater public benefits and would be the highest and best use of the land.

The district, and the Island of Hawaii, would benefit in many ways from a wide development of geothermal resources. At present the lack of water and power in the district impedes and prevents the best use of the agricultural potential and manpower resources in the area. A local source of reasonably-priced energy could stimulate agriculture and related activities, and if geothermal energy were plentiful enough, new industries could develop, which would in turn provide jobs and improve the local economy. The benefits of such development are generally acknowledged, since it is the policy of both the State and County Governments to encourage and promote the rapid development of this indigenous energy source, especially since geothermal energy is environmentally an exceptionally clean source of energy.

ENVIRONMENTAL IMPACT STATEMENT FOR
GEOTHERMAL RESEARCH AND DEMONSTRATION FACILITY
UTILIZING THE HGP-A WELL AT
PUNA, HAWAII

Presented by the Department of Planning & Economic Development
of the State of Hawaii

Prepared by Robert M. Kamins

September 1977

EXHIBIT *A-8*

EXHIBIT 8

Prefatory Note

This Environmental Impact Statement utilizes much of the information presented in An Assessment of Geothermal Development in Puna, Hawaii, a report of the Hawaii Geothermal Project issued in January 1977. Data obtained from subsequent testing of the experimental well HGP-A have been added, as well as statements concerning measures which will be taken by this project to minimize potentially adverse environmental effects of using the well to generate electricity.

1. THE NATURE AND SIGNIFICANCE OF THE PROJECT

Scientific exploration has established the existence of geothermal resources on the Island of Hawaii. First, in 1973, a 4,000 foot deep exploratory well drilled in the Hawaii Volcanoes National Park by Dr. George Keller, of the Colorado School of Mines, under a grant from the National Science Foundation, demonstrated that at depth a heat gradient existed which, projected to areas well below sea-level, would generate steam -- if sufficient water penetrated the rock at that depth.

Then, in the first half of 1976, the Hawaii Geothermal Project, University of Hawaii, drilled a 6,400 foot research well in Puna, down some 6,000 feet below sea level. It tested out with temperatures in excess of 600 degrees Fahrenheit, possessing a recharging water source which flashed into steam with a wellhead pressure between 60 and 70 p.s.i. This pressure is sufficient to power an electric generating unit of approximately five megawatts -- in itself a resource of some commercial value, but more important as evidence that a larger development of geothermal resources may be economically feasible on the Big Island.

Geophysical and geological evidence suggests that other areas of the Island of Hawaii besides Puna and the Hawaii Volcanoes National Park (where economic exploitation of resources is not permitted) have geothermal potential. In fact, on the basis of that evidence the Hawaii Geothermal Project had planned to drill at two additional sites, on the southwest rifts of Kilauea and of Mauna Loa, but abandoned this more ambitious program of exploration for lack of funds. It is now proposed to conduct extensive tests of HGP-A, the experimental well, and to install and operate a wellhead generator. Under an agreement with the landowner, the Kapoho Land Development Company, the State of Hawaii will put in place a generator with a variable capacity of between two and ten megawatts for the purpose of gaining operational knowledge about

the production of geothermal energy on the Island of Hawaii and demonstrating its economic feasibility. It is anticipated that much of the electricity surplus to the needs of the geothermal station generated will be purchased by the Hawaii Electric Light Company.

If funds are obtained from the federal government or elsewhere, application of geothermal energy to uses other than the generation of electricity may be tested at the station. These uses would involve utilization of the flow of hot water after it has left the generating unit and before it is directed back into the ground.

No additional drilling is presently planned for the 4-acre site covered by this Environmental Impact Statement, but one or more step-out wells may be drilled in adjacent acreage to test the size of the geothermal reservoir. Should more drilling be undertaken by the project, a supplemental E.I.S. would be prepared.

It is a purpose of the project to further the development of geothermal resources on the Island of Hawaii, not only those tapped by HGP-A, but also the reservoirs which may lie elsewhere along the rift zones in Puna. For that reason this E.I.S. considers the environment of the entire Puna District, though it does examine with greater particularity the conditions of water, air, flora and fauna in the immediate vicinity of the project area on the lands of the Kapoho Land Company, approximately 3 miles southeast of the village of Pahoa.

SIGNIFICANCE OF THE PROJECT

The paradoxical position of the State of Hawaii with respect to energy has been much commented on since the national petroleum crisis in the winter of 1974. Naturally, Hawaii is lavishly supplied with energy from the sun, tradewinds and action of the sea, but completely lacks the fossil fuels used

as standard energy sources by contemporary technology. A few tiny hydroelectric facilities on Kauai and Hawaii produce some power on those islands, and on the Island of Hawaii burning the bagasse (left in the sugar mill after the juices have been extracted from the cane stalks) generates considerably more -- but the combined contribution of these two indigenous energy sources to the State's consumption of BTU's is only a fraction of one per cent of the total.^{1/} More than 99 per cent is derived from petroleum products, the bulk of which is refined on Oahu from crude oil imported from abroad and then sold at prices above those which generally prevail on the continental U.S.

Partly as a consequence of the high cost of petroleum, electricity rates in Hawaii are among the most expensive in the United States. The average here is brought up by the high rates in the neighbor islands. For example, as of August 12, 1977, residences using only 500 kilowatt-hours in a month would have paid these bills: on Oahu, \$25.18, Maui \$34.45, Hawaii, \$37.71, Lanai, \$36.03, Kauai, \$37.84, Molokai, \$39.29.^{2/}

Since 1974 there has been a heightened concern about Hawaii's virtually complete dependence on petroleum shipments, not only the costliness but also the uncertainty of maintaining the vital flow of oil under the hazards of political instability in the Middle East and in Southeast Asia. A variety of energy sources indigenous to Hawaii (as well as nuclear power plants which apparently are not yet scaled down to a size economical for Hawaii) are being investigated. These include solar collectors; wind energy conversion;

^{1/} In 1974, the amount coming from hydroelectric was 0.03 per cent while 0.31 per cent of the total energy consumption came from the burning of solid wastes, i.e. bagasse. See flow chart in Alternate Energy Sources for Hawaii (Honolulu, University of Hawaii and Department of Planning and Economic Development), February 1975, p. 25.

^{2/} Rates supplied by the Hawaii State Public Utilities Commission. For comparisons with mainland cities, see Federal Power Commission, Typical Electric Bills (Washington, D.C., annual).

solid waste and biomass conversion; utilizing the energy of waves, tides and ocean currents; and geothermal energy.

Several of these potential new sources of power -- notably solar, biomass conversion, wind, ocean thermal and geothermal energy -- offer promise of supplying significant quantities of energy, taking "significant" to mean 10 per cent or more of the total electrical energy demand of the state.^{3/} At this writing, geothermal power seems to offer greater possibilities of near-term development to economic significance than any other indigenous energy source, even though solar heat is the first to be used, already being utilized in a few homes in Hawaii to heat domestic water supplies.

The exploratory well, HGP-A, gives preliminary indication that one or more geothermal reservoirs may exist in Hawaii, having a temperature and pressure adequate for commercial exploitation, either in the production of electric power or by direct applications of the hot water/steam coming from wells tapping the resource. The projected research and demonstration facility will serve as a research tool for appraising the geological and engineering characteristics of the test well as used in production. Further, the facility can be used for researching modes of direct application of the heat, as in agricultural and industrial uses.

By helping to define the nature and extent of the geothermal resource in Puna, and by demonstrating how the resource may be used in electrical and non-electrical applications, the facility may be instrumental in shaping the development of this new energy source and in setting local standards for its utilization.

^{3/} Comparison of these potential energy sources is made in a 1975 report of the [Hawaii] State Advisory Task Force on Energy Policy in Alternate Energy Sources for Hawaii (Honolulu, Natural Energy Institute of the University of Hawaii and the Department of Planning and Economic Development).

-3-

2. ENVIRONMENTAL SETTING: THE DISTRICT OF PUNA PRIOR TO GEOTHERMAL DEVELOPMENT

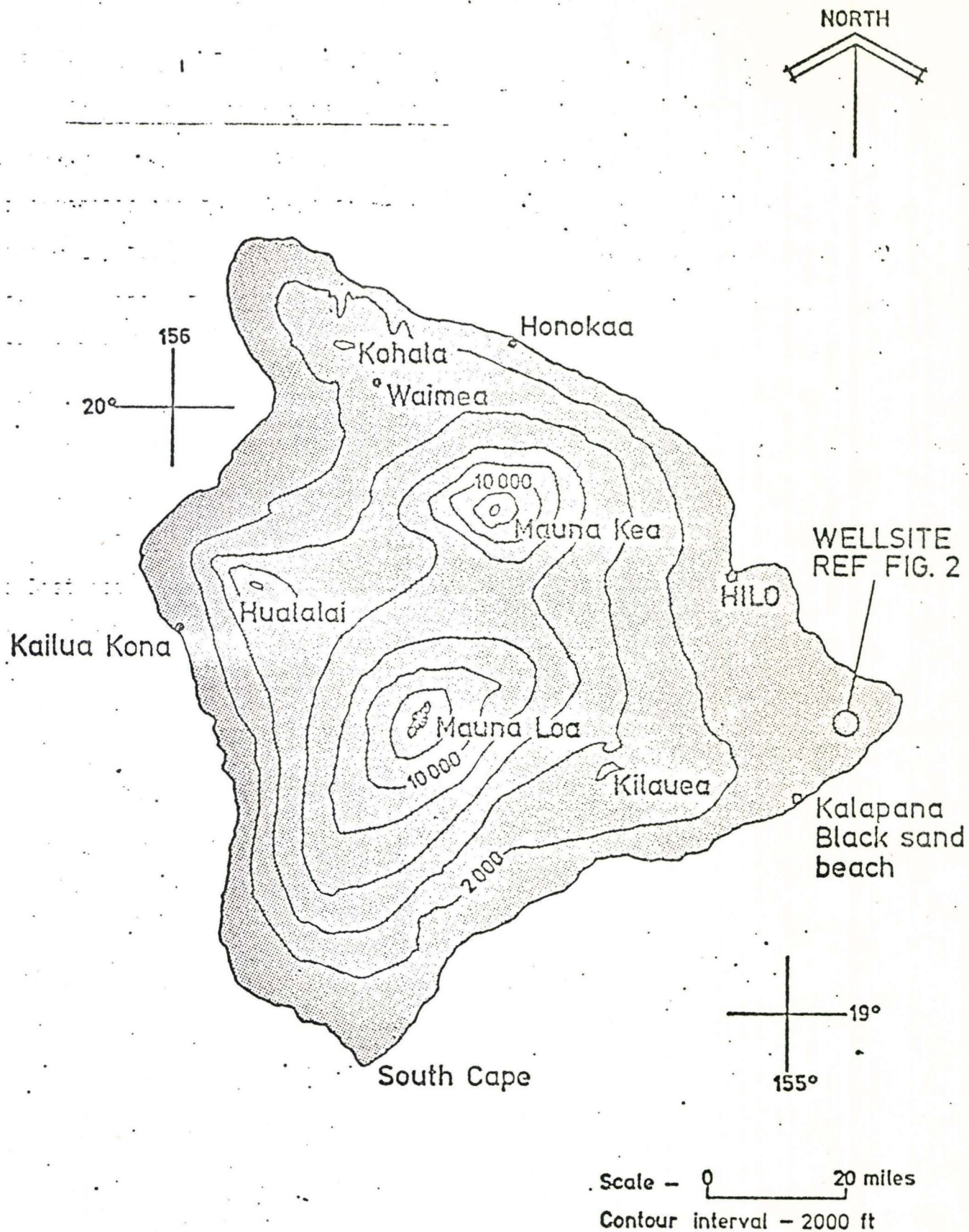
A. The physical environment generally.^{1/}

The Puna District, site of the exploratory geothermal well, is the easternmost projection of the Island of Hawaii, comprising approximately one eighth of its 4,038 square miles. Much of the District is formed by undissected volcanic uplands, that of Kilauea to the north and that of Kalapana to the south, but between, running from the Kilauea Caldera Complex eastward to the sea around Cape Kumukahi, is the Puna cone and crater areas, marked by pu'us and craters of recent eruptions, notably that of 1955.

With an estimated mid-1976 population of 8,200, Puna is the second most populous of the nine districts of the Big Island -- some distance behind South Hilo District, where approximately 40,000 people live. The basis of comparison is made clearer by noting that only two "towns" in Puna, Kea'au and Pahoa, contain as many as -- and not much more than -- a thousand people. Most of the residents of Puna live near the chief enterprise of the area, the Puna Sugar Company, or in widely spaced clusters of houses along the coast. Only a few have homes in the new and largely undeveloped subdivisions which have been drawn across the map of the District. There are only a dozen houses within a mile radius of the drill site itself.

Over half of the Puna District is thinly covered by the histosols which commonly occur on geologically young lava lands. In a band stretching across the west central part of the District -- to the west of the well site -- is an area of entisols, weakly developed soils found on volcanic ash, among other locations. On this land has developed an area of marked environmental contrast: there is fertile soil and lush vegetation over the lower-lying

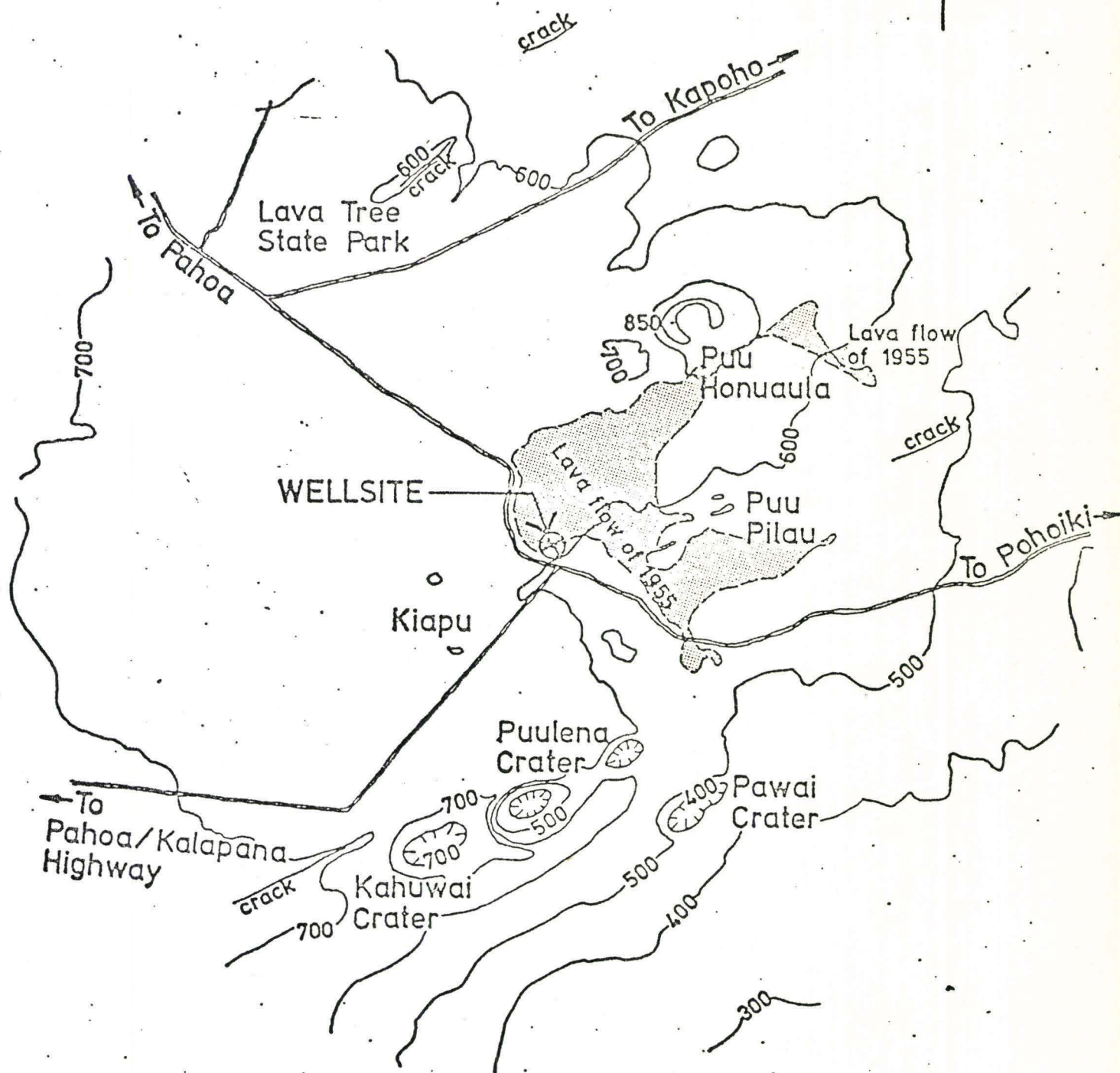
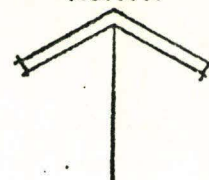
^{1/} Much of this section is derived from a report of the Hawaii Geothermal Project, Environmental Baseline Study for Geothermal Development in Puna, Hawaii, (University of Hawaii, September 1976).



Source: Hawaii Geothermal Project Well Completion Report, HGP-A, Kingston, Reynolds, Thom & Allardice, Ltd. (Auckland, N.Z., 1976)

Figure 1 Map of Hawaii

NORTH



Contours shown in feet

Source: Same as Figure 1.

Figure 2 - Site Location, Experimental Well HGP-A

fields, while the geologically younger upper slopes are dotted with ohias, which are the most common and most widely distributed species of native trees in Hawaii. Between fertile land and the slopes, there is dry desert, where recent lava flows have blackened the land, giving it a desolate and empty appearance. In a few places, thin plumes of steam mark vents where the underground heat of the area escapes into the atmosphere. Along the coast, the ocean beats against black lava cliffs. Where there are beaches, they, too, are usually black, produced by the explosion of hot lava meeting the sea.

B. Groundwater supply*

The hydrology of the Puna District is not well established. It had been thought that the area was generally underlain by a supply of basal water floating on salt, with a relatively narrow band of dike-confined water (not floating on salt water) running across the southern part of the District, and with a coastal zone of brackish basal water west of Kalapana.^{2/} However, there is only limited use of the local ground water supply for domestic purposes; the water supply for Pahoa and other communities in the southeastern part of Puna is pumped in from the adjacent District of South Hilo.

Indeed, sampling of seven water wells within a radius of about two and one-half miles from the geothermal well site revealed high salinity (above 270 mg. per liter) in four of the seven and at depths no greater than a few hundred feet below sea level. While salination of basal water due to intermixing with underlying salt water is a common phenomenon in coastal areas,

* Research on this section was done by Dr. Robert W. Buddemeier, Associate Professor of Chemistry, Dr. Peter Kroopnick, Associate Professor of Oceanography, Dr. Theodorus Hufen, Research Associate in the Hawaii Institute of Geophysics, and Dr. L. Stephen Lau, Director of the Water Resources Research Center.

2/ H. T. Stearns, Geology of the Hawaiian Islands (Honolulu, Department of Land and Natural Resources, 1967. Reprint of Bulletin 8 of 1946).

where unconfined fresh water lenses are thinnest and easily perturbed by tidal effects or heavy pumping, the relatively high salinity of inland wells (such as Malama-ki, Geothermal No. 3, and Airstrip Well -- see Figure 3) suggests that a classic Ghyben-Herzberg lens, in which fresh water floats on salt water, does not exist in the portion of Puna around the exploratory well site.

Groundwater in the area, (and rainwater samples as well for control purposes) was tested not only for the chemical characteristics (Table 1), but also for its microbiological qualities (Table 2). Moderately high values for coliform bacteria were recorded at Isaac Hale Park Spring, where the geothermally heated pool is used for casual bathing, and a much higher count was made of the sample from Allison Well. Otherwise, no results of a cautionary nature were reported in the baseline study. As testing of the exploratory geothermal well proceeds, the existing water wells will be monitored for changes in chemistry or microbiology which may accompany the test flowing.

C. Geothermally-related chemical toxicants in air, water, soil*

Particular attention must be given to ascertaining if the chemicals commonly found in geothermal water or steam pose a threat to the environment. From May 1975 to date, the environs of HGP-A have been tested for mercury and toxic gases, particularly the sulfur compounds known to be emitted in geothermal areas. With respect to the fixed gases -- SO_2 and H_2S -- there has been no evidence of change from pre-drilling through recent flashing experiments (Table 3). These values have been consistently at or below

* Dr. Barbara A. Siegel and Dr. Sanford M. Siegel, respectively Associate Professor of Microbiology and Professor of Botany, jointly investigated potential effects on air quality, the soil and plant life in the area, with the assistance of Dr. Thomas Speitel, Research Associate in the Department of Botany, and the following students voluntarily worked with the Professors Siegel on geotoxicology testing: Willie Cade, Melvin Calvin, Anna LaRosa, Kapuanani Lee and Hope Stevens.

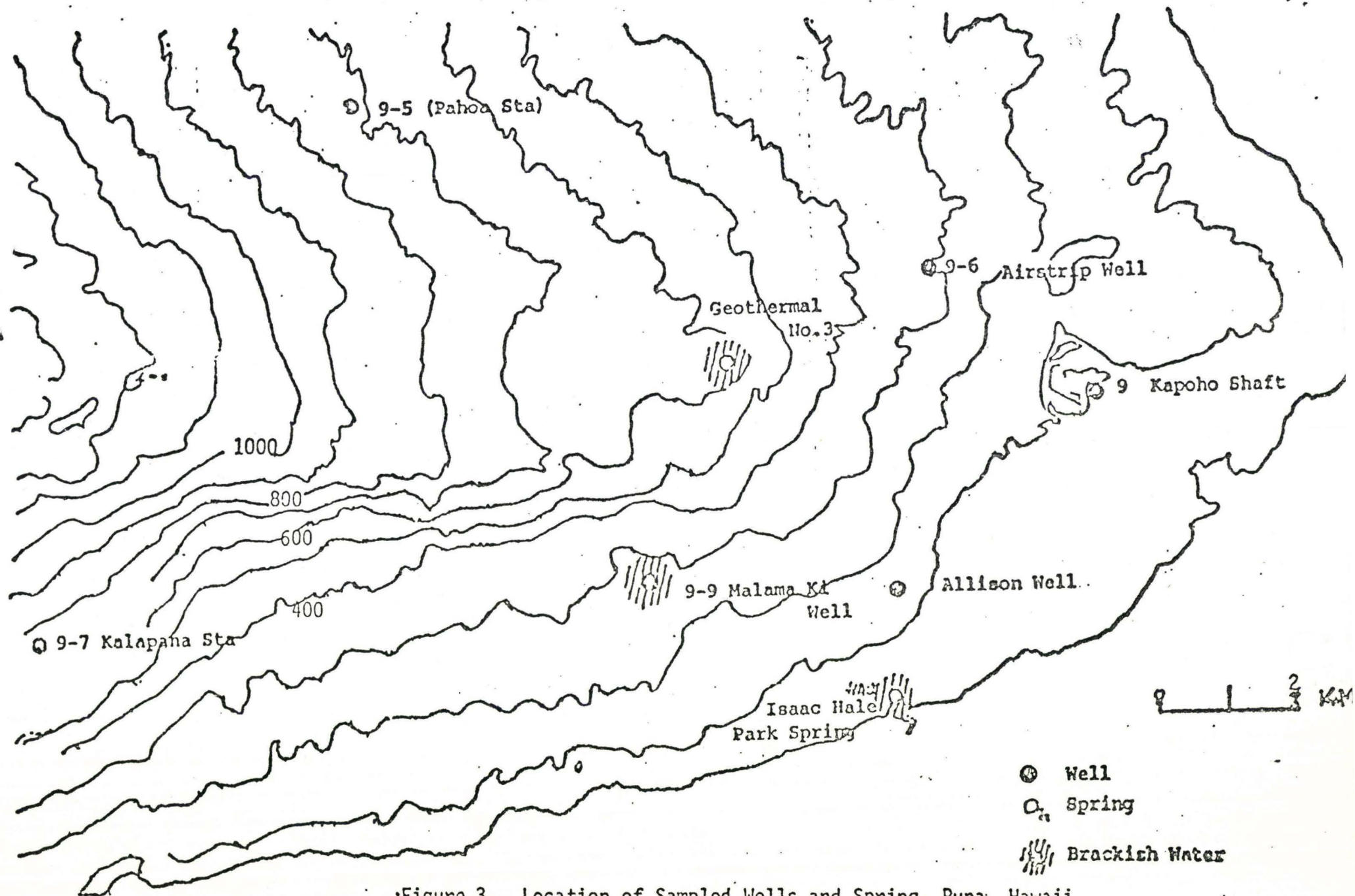


Figure 3. Location of Sampled Wells and Spring, Puna, Hawaii

TABLE 1. CHEMICAL DATA ON GROUNDWATER AND RAINWATER
PUNA, HAWAII, PRIOR TO DRILLING
EXPLORATORY GEOTHERMAL WELL

OLD NO.	STATE NO.	NAME	DATE	T*	pH	Na**	K	Ca	Mg	Cl	HCO ₃	SO ₄	SiO ₂	N***	P
9-5	2986-01	PAHOA STATION	1-6-75		7.30	36.0	2.72	1.58	2.7	13.5	48	21.1	50.0	0.252	0.078
9-7	2487-01	KALAPANA STATION	1-6-75	28.5	7.68	89.6	5.20	5.30	6.6	132.2	38	37.2	44.5	0.070	0.056
9	3080-02	KAPOHO SHAFT	1-6-75	25.5	7.80	85.8	6.60	42.4	37	16.9	372	20	53.6	0.378	0.233
9-6	3081-01	AIRSTRIIP WELL	1-6-75	33.0	7.42	238	13.6	23.0	28	303.5	48	204	71.3	0.014	0.040
	2881	ALLISON WELL	1-7-75	37.5	7.35	216	10.8	13.4	15	281	132	69.2	24.1	>14	<0.002
		ISAAC HALE PARK SPRING	1-7-75	36.0	7.75	2020	86.0	32.4	200	3534	56	507	81.5	1.218	0.016
9-9	2783-01	MALAMA KI WELL	1-7-75	52.3	7.02	2105	109	66.8	210	3811	144	471	100.7	0.280	0.006
		GEOTHERMAL #3	1-7-75	93.0	6.85	2050	190	76.8	52	3274	30	314	96.6	0.003	0.006
		RAIN AT KALAPANA STATION	1-6-75			4.5	0.25	0.25	0.75	7.2		~2.5	0	0.024	<0.02

*TEMPERATURE GIVEN AS °C

**CHEMICAL DATA IN mg/l

***NO₂ NO₃ as N

TABLE 2 MICROBIOLOGICAL QUALITY OF GROUNDWATER

PUNA, HAWAII, PRIOR TO DRILLING

EXPLORATORY GEOTHERMAL WELL

WELL/SHAFT NO.	STATE NO.	NAME	DATE OF SAMPLE	COLIFORM MPN No. per 100 ml	FECAL COLIFORM MPN No. per 100 ml	REMARK
9-5	2986	PAHOA	1-6-75	<3	<3	Unchlorinated sample
9-7	2487-01	KALAPANA	1-6-75	<3	<3	Unchlorinated sample
9	3080-02	KAPOHO SHAFT	1-6-75	460	<3	
9-6	3081	AIRSTRIP	1-6-75	<3	<3	
9-9	2783	MALAMA KI	1-7-75	<3	<3	
---	---	ISAAC HALE BEACH PARK HOT SPRING WATER	1-7-75	1500	7	
---	2881	ALLISON	1-7-75	≥24,000	93	Well bottom mud in sample

TABLE 3

TESTING FOR CHEMICAL TOXICANTS AT THE
HAWAII GEOTHERMAL PROJECT WELL: A CHRONOLOGY

DATE	STATUS OF WELL	RESULTS OF ANALYSIS					
		FIXED SO ₂	GASES ¹ H ₂ S	Air ²	Water ³	MERCURY Soil ⁴	Plant ⁵
May 1975	Pre-drilling	<0.5	<0.5	1.1	2.5	43-59	130/263 ⁵
May 1976	Post-drilling	<0.5	<0.2	1.2	5.0	141/356	160/571
June 1976	Preliminary well test	<0.5	<0.2	1	3.0	--	--
July 1976	Flashing	<0.5	<0.2	9.9*	4.6	--	--
November 1976	Well shut down	--	--	>10.0*	--	--	--
April 1977	Well shut down	<0.5	<0.2	--	--	--	--
July-Aug. 1977	Well shut down	<0.3	<0.2	0.8			

¹ In ppm

³ In µg/l

² In µg/m³

⁴ In µg/kg

⁵ Nutgrass within 50m, Ohia-fern at ca. 100m distance.

* These high values for mercury, even when the well was shut down, seem to reflect elevated activity along the East Rift with the formation of new emission centers, such as Heiheiahulu, rather than emissions from the well.

detection thresholds are well under hazardous levels. In spite of the proximity (25 miles) of natural vents in the Volcanoes National Park which supply these sulfurous gases continuously. In these fumarole areas, measurement during 1971-76 yielded peak values as high as 25 ppm for SO_2 and 5 ppm for H_2S . These toxic emissions apparently reach the HGP drill site area only infrequently and for brief periods. Their lack of persistence may be an important environmental consideration. Aside from convective and wind dispersal processes, these gases may be oxidized both photochemically and biochemically to sulfates, and the capacity both of soil microorganisms and vegetation for metabolizing these sulfur gases may contribute to ecological "detoxification".

The same consideration cannot be applied to mercury. It is a potential toxicant in any form, although more so in elemental and alkyl forms. Various figures have been cited for maximum allowable air mercury. Schroeder^{3/} has suggested an 8-hour occupational limit of $10\mu\text{g}/\text{m}^3$ but recommends no more than $0.1\mu\text{g}/\text{m}^3$ for continuous exposure of the population at large. Applying a provisional Federal exposure value of $1\mu\text{g}/\text{m}^3$ as a reference figure, it is obvious from Table 3 that HGP drill site levels were at threshold up to the flashing experiment, but it is also clear that up to the 22 July 1976 flashing, the mercury levels were area values not related to drill site operations. Hawaiian thermal areas are essentially like those elsewhere in the world with respect to mercury in air, water, soil and plants (Table 4), with norms tending to be appreciably higher than in nonthermal areas.

The upsurge of air mercury levels during flashing seems to have been a "burst" releasing accumulated mercury at depth. Tests conducted since drilling of HGP-A began have yielded no evidence of a sustained buildup of mercury at

^{3/} Schroeder, H., Air Quality Monograph No. 70-16, American Petroleum Institute, Washington, 1971.

TABLE 4

MERCURY LEVELS OUTSIDE THE HGP-PUNA DRILL SITE AREA:
COMPARATIVE AIR AND WATER DATA, 1971-1976

SAMPLE	HG CONTENT
Air	<u>$\mu\text{g}/\text{m}^3$</u>
Thermal	
Hawaii	0.7-40.7
Iceland	1.3-37.0
U.S.S.R. Kamchatka-Kuriles	0.3-18
Non-thermal	
Hawaii	0.04-0.3
Iceland	0.62-1.0
New York	≤ 0.014
Cincinnati	0.03-0.21
Eastern Pacific (open sea-west of California)	≤ 0.0007
Water	<u>$\mu\text{g}/\text{l}$</u>
Poipu Beach (Kauai)	2.1
Kuhio Beach (Oahu)	2.3
Nuuanu Stream	0.6
Oahu aquifer	< 0.2
Rain, Hawaii, January 1972 Island of Hawaii, general	0.20-0.25
HVNP fumarole condensate, 1972	20-40
Western Atlantic, general	0.01-0.30
Hawaii aquifer (Puna)	≤ 0.5

or around the drill site that can be attributed to geothermal energy development operations.

D. Flora and Fauna

(i) Plants*

While there are trees on the Puna landscape -- the ohia just noted, roadside or backyard mangoes, citrus, monkeypods and other ornamentals -- the District is by no means forest-covered. There are four state forest reserves in the District (Nanawele, Malama-ki, Keauhohana and Puna), but only the latter is extensive and none rate among the choice timber areas of the Big Island. Norfolk pines have been planted east of Pahoia in an attempt to supply the local Christmas tree market, but they have not flourished.

It was beyond the resources of the Hawaii Geothermal Project to assess the lesser flora of the Puna District in any detail. However, an area within a mile of the drill site was examined, and it seems sufficiently representative of those inland sections of the District which are not either in cultivation or well populated -- and these relatively empty places comprise the bulk of the District -- to warrant inclusion in this description of Puna at large.

The well site is on an exposed lava flow of 1955. The undisturbed part of the flow consists of barren aa, covered by a dense growth of lichens, with scattered ferns and ohia lehua. Further off, around Lava Tree State Park approximately three-quarters mile to the west, there are areas of forest, consisting primarily of ohia, the size of the trees being related to the age of the underlying lava flow. Hence, most trees are small to medium height, but there are infrequent kipukas (islands of growth on land not subject to recent volcanism), in which some trees reach up to 100 feet. The groundcover

* Research on this section was done by Barbara A. Siegel and Sanford M. Siegel, assisted by Thomas Speitel and the following students: Willie Cade, Melvin Calvin, Anne LaRosa, Kapuanani Lee and Hope Stevens.

around the ohia trees consists largely of false staghorn ferns, grasses and several species of wild orchids. Around the larger trees are some treeferns and ieie vines (Freycinetia arborea). All these endemic species are common to areas of Hawaii covered by lava flows of no great age.

In locations disturbed by roads, footpaths, trails and bulldozer tracks, however, there is a heavy admixture of introduced trees, shrubs, vines and grasses. Such exotic flora are found, for example, in the vicinity of Lava Tree State Park and in many areas downslope from the well site. This exotic plant population includes mango trees, papayas, guava, bamboo, kukui trees (Aleurites moluccana) sugar cane, bananas, Indian pluchea, Jamaica vervain, and sensitive plant (Mimosa pudica). A stand of Norfolk pines, already noted, rises between the well site and the Park, and there are groves of albizia along the road and at the Park.

It is impossible to make an absolute determination as to the absence of endangered and threatened species of plants within any area of appreciable size around the well site. However, in the process of making baseline studies of possible geotoxics sometimes associated with geothermal activity, quadrat and transect analyses were carried out in May 1975 and re-examined in January 1976 at the well site.^{4/} The genera of plants found at the site, identified in consultation with Dr. Darrel Herbst, then of the Department of Botany are: ageratum, andropogon, arundina, asclepias, brachiaria, carex, cassia, castilleja, cuphea, cyperus, desmodium, dicranopteris, emilia, erichtites, erigeron, lantana, lycopodium, melastoma, melinis, metrisideros, nephrolepis, pluchea, pteridium, rhychospora, rubus, saccolepis, spathoglottis, sphenomaris, stachytarpheta, tritenia, and vernonia.

^{4/} The mode of analysis is described in a report of the Hawaii Geothermal Project, Environmental Baseline Study for Geothermal Development in Puna, Hawaii (Honolulu, September 1976).

Comparing these genera with the most relevant list of known endangered genera and their familial associations -- a tally of families, genera and species prepared by Charles Lamoureaux, Professor and Chairman, Department of Botany for the adjacent Hawaii Volcanoes National Park -- and with the comprehensive list of endangered, threatened and extinct species presented by the Secretary of the Smithsonian Institution to the Congress of the United States as House Document N. 94-51, 15 December 1974, it is concluded that endangered and threatened species of plants, if present at all at the well site, are extremely infrequent. Thus, the probability that well site operations will present this type of biohazard is deemed to be minimal.

With respect to the more general question of hazards to vegetation, it should be noted (1) that toxic emissions resulting from well operations are not likely to differ from those normal to natural vents and magmatic outgassing in Hawaii, and (2) that natural populations established by post-eruption colonization in areas of recent or current vulcanism are likely to be more resistant to toxic geothermal emissions than would be the case in non-volcanic locations.

(ii) Animals, particularly birds

The region of Puna around the geothermal well site, limited as it is in natural food sources for mammals, is not rich in fauna. The sugar cane fields to the west and the papaya farms to the east of the site support the rats (Polynesian and Norway) which are found on all eight main islands of Hawaii. The mongoose is also well established locally. On the slopes of the mountains of the Big Island deer and feral goats are at once quarry for hunters and problems for those who would preserve the ecosystem, but they do not come to this section of Puna.

The only valued animals which might be disturbed or conceivably threatened by geothermal development in the District are birds. There are on the Island

of Hawaii several species of indigenous or endangered species, and it was necessary to study the area around the well site to ensure that none of these species were adversely affected by the geothermal exploration. Consequently, the environmental assessment was limited to birdlife which might feed or breed in the area of Puna near the well site.*

Field observations in February 1976 were concentrated on looking for the two species of endemic land birds which might be expected at the low elevation (approximately 400 feet above sea level) of the drill site. These are the Hawaiian hawk (Buteo solitarius), which is classified as "rare and endangered", and the Hawaiian short-eared owl, or pueo (Asio flammeus sandwichensis). No evidence of either was found -- perhaps because most of the native vegetation in the area has been replaced by exotic plants -- but of course it is possible that at times both species may occur in the general area. The hawk, in particular, is a wide-ranging species. This, however, is speculative, since no evidence was found.

Nor is the area heavily populated with introduced birds. During the survey, only seven species were observed:

1. Spotted dove (Streptopelia c. chinensis)
2. Melodious laughing-thrus (Garrulax canorus)
3. Japanese white-eye (Zosterops j. japonica)
4. Common myna (Acridotheres t. tristis)
5. House finch (Carpodacus mexicanus frontalis)
6. Spotted munia (Ricebird) (Lonchura punctulata)
7. Cardinal (Cardinalis cardinalis)

It is the considered opinion of the ornithologist who studied the area that the activities at the geothermal well site have had no adverse effect on

* The assessment was made by Andrew J. Berger, Chairman of the Zoology Department, University of Hawaii at Manoa.

any bird species inhabiting the area. Even an adverse effect on some of the introduced birds would not necessarily be detrimental, since some of these species, as the house finch and spotted munia, have been highly pestiferous in destroying crops on Hawaii, but no impact on any species was discerned.

In summary, with no evidence or past records of rare and endangered species inhabiting the area, and no indication of adverse effects on introduced species, it is concluded that any impact of geothermal drilling on the limited birdlife of the area adjacent to the site has not been significant. A judgment concerning the impact of geothermal development which might occur in other portions of Puna would of course require a localized study.

E. Archaeological Sites*

Puna has played a relatively insignificant role in the political history of Hawaii. During all of its known history, the District has produced no great family or chief whose support was crucial for control over land contested by warring factions. Why it was that Puna never developed a political power base -- for lack of population or inadequate food sources to support a sufficiently strong army -- is not clear, but it is evident that in Polynesian times control over Puna was wielded by the bordering districts of Hilo and Ka'u.

Consequently, there are relatively few archaeological sites in Puna, say in comparison with the Kona coast or the northwest corner of the Island of Hawaii, and there is no major site of archaeological research in the District. What few sites exist are mostly along the coast, some distance from likely areas of geothermal development, which are along the rift zones inland.

The sole archaeological site complex in Puna is Kahuwahi Village at Makaukiu, above Cape Kumukahi, which is the easternmost projection of the Island. Around the cape to the south, near Isaac Hale Park, is Mahinaakaka

* Research on this section was done by William Bonk, Professor of Anthropology at the Hilo Campus of the University of Hawaii.

heiau, in relatively good condition, except for the severe erosion of its eastern wall. Another ten miles down the coast are two additional heiaus and adjacent sites with petroglyphs, at Apua and Wahaula-Puuloa.

More petroglyphs are found near Kapoho, about three miles inland from Cape Kūlikahi, and almost four miles from the exploratory geothermal well. These figures are unusual in that they are cut into the face of larger upright basaltic slabs, instead of the usual flat pahoehoe, and exhibit an "ear plug" seen at only a few other sites in Hawaii.

In the same general area, approximately two miles north of Kapoho, are the ruins of Kukii Heiau, repeatedly robbed of its stone -- for the building of the foundation walls of Iolani Palace in Honolulu in 1879, again for Queen Kapiolani's residence, and more recently for other construction.

With the exception of the petroglyphs at the Kapoho dome, none of the archaeological sites of Puna seem to be in the path of likely geothermal development in the District. If the Kapoho area is planned or authorized for development, protection of these petroglyphs should be assured before the development begins.^{5/}

F. Aesthetic Considerations

Three qualities of developed geothermal fields must be considered for their impact on the aesthetic conditions of a geothermal area: they are rather noisy, they may emit sulfurous fumes, and they are likely to be covered with large structures. The noise caused by the escape of steam under pressure can be considerable, enough to make conversation difficult within a hundred yards downwind of a producing well, enough to be a nuisance to persons living within about a half-mile of the well -- unless the steam is directed to a generator

^{5/} A brief description of sites in Puna is appended to the Environmental Baseline Study for Geothermal Development in Puna, Hawaii (Hawaii Geothermal Project, University of Hawaii, September 1976).

or otherwise adequately muffled. With appropriate muffling devices, the sound level can be held down to tolerable levels, the tolerability being understood as a function of the number of persons affected and their sensitivity to noise, as well as a function of decibels. There is only one house within a half-mile of the present exploratory well site.

In any case, the noise levels of wells in any future geothermal field in Hawaii must be considered before development takes place, both for individual wells and, cumulatively, for a field. Given the expanse of little-used land in Puna, and developing technology for muffling the noise, there should be means for solving the noise problem in an environmentally acceptable manner. The mode of dealing with the problem on this project is discussed below.

The consideration of proximity of the well to population also applies to the sulfur smells (chiefly from H_2S) which may be released from geothermal waters. HGP-A is regarded as relatively unsmelly by persons who have worked at the well -- no worse, for example, than the "rotten egg" odor encountered near fumaroles in the Volcanoes National Park. However, during the well testing in April 1977 complaints were made by a few local residents. These were referred to the chief sanitarian of the Department of Health on Hawaii. His report of 12 May 1977 accepted the findings of the Hawaii Geothermal Project biotoxicologists that emissions of H_2S and other elements posed no health hazard. That does not dispose of the matter of objectional smell, a highly subjective matter. It will be minimized by the use of "scrubbers" in the generator equipment, as will be described in Section _____ of this Statement.

Questions of aesthetic appearance arise when a sizeable geothermal field is developed, since the field must have a network of steam-collecting pipes to supply the generating plant, the plant itself, and may require cooling towers to enhance the efficiency of the generator. (Under a vapor-turbine cycle mode of production, the towers may not be required and less noise-control equipment

needed, but this technology is not yet available.) However, this 4.1 acre research and demonstration plant has a more limited aesthetic impact; modes of dealing with it are also discussed in Section _____.

3. SOCIOECONOMIC CONDITIONS IN PUNA

A. Population

Population movements in the Puna District during this second half of the twentieth century has roughly paralleled demographic changes of the entire County of Hawaii -- declining during the 1950's, remaining essentially stable in the '60's, then rising in the 70's so that the estimated 1977 level is somewhat above the population totals reported in the mid-century census. Projections for future changes are positive, both for the County and for the District.

TABLE 5

POPULATION TRENDS: HAWAII COUNTY, SOUTH HILO AND PUNA

1920-1990			
Year ^{1/}	Hawaii County	South Hilo	Puna District
1920	64,895	23,828	7,282
1930	73,325	29,572	8,284
1940	73,276	32,588	7,733
1950	68,350	34,448	6,747
1960	61,332	31,553	5,030
1970	63,468	33,915	5,154
1975	73,000	38,000	7,900
<u>Estimates</u> ^{2/}			
1980	84-99,000	35-47,000	5,500-10,000
1990	115-137,000	37-55,000	8,400-13,000

^{1/} As of January 1 for 1920, April for (censuses of) 1930-1970, July 1 for 1975; unspecified for projected estimates.

^{2/} Range established by three series of projections: one made by Department of Planning and Economic Development, State of Hawaii in 1975, another by Belt, Colline and Associates, Honolulu, in 1973, and a third by Daly and Associates, Honolulu, in mid-1976. The minima shown for Hilo and Puna in 1980 and 1990 are obviously too low, barring some catastrophe.

The reduction in population for Puna -- as for Hawaii County as a whole -- between 1940 and 1960, is at least partly attributable to the mechanization of sugar plantations, for long the chief employer on the Island and in the Puna District. South Hilo District, which demographically approximates the City of Hilo, showed a growth over most of this period, to include over half of the total Island population by 1970, a factor of significance to Puna, since the District increasingly has come to serve as a "bedroom" area for persons working in the city.

The lower end of the range of estimates of future population shown in Table 5 appear to be too low, at least for Hilo and Puna. They might prove to be true if the current depression of the sugar industry were to cause more layoffs, and if tourism and other industries which have been replacing sugar in the Island's economy were to level off or drop, but that basis of forecasting seems unduly pessimistic. A more likely and prudent assumption is that the growth of population experienced in the Puna District during the first half of this decade will continue, though perhaps at a decreased rate. A rise from the approximately 8,000 population now in the District to some 12,000 by 1990 seems to be a reasonable expectation.

During the last six years, a disproportionately large part of the population growth in Puna has occurred in the age bracket where people are most likely to be in the labor market, from ages 22 through 44. The changing pattern of age distribution has obvious significance for infrastructure needs of the District. The under-22 portion of the population (37% in 1976) particularly relates to projected demand for schools and play spaces, those between 22 and 64 for roads and police protection, those over 64 (13% in 1976) for public health services, recreation and mass transit facilities.

B. Housing

Judging from the limited data available, the quantity of housing available in Puna is relatively adequate. The basis of this observation is an inter-district comparison made by the Department of Research and Development of the County of Hawaii, shown in Table 6, which indicates that the ratio of population-to-housing units in Puna was second lowest among the nine districts of the Big Island and well below the county average.

TABLE 6

HOUSING UNITS AND POPULATION-TO-HOUSING UNIT RATIOS

COUNTY OF HAWAII, BY DISTRICT

1969, 1971 and 1973

<u>District</u>	Housing Units as of:			Ratio of Population to Housing Units: <u>July 1973</u>
	<u>July 1969</u>	<u>December 1971</u>	<u>July 1973</u>	
PUNA	1,777	2,049	2,561	2.42
South Hilo	9,654	10,925	12,218	3.15
North Hilo	590	539	543	2.83
Hamakua	1,510	1,575	1,597	2.85
North Kohala	952	970	982	3.10
South Kohala	849	947	1,138	2.48
North Kona	1,764	2,727	3,144	2.07
South Kona	1,041	1,134	1,164	3.09
Ka'u	<u>1,046</u>	<u>1,100</u>	<u>1,171</u>	<u>2.97</u>
County Totals	19,183	21,966	24,518	2.86

Source: Data Book 1975, County of Hawaii Department of Research and Development (Hilo, Hawaii, 1975), Table 74, p. 69.

Between 1973 and 1976, some 300 additional units, net of those razed or otherwise removed from the supply, were constructed in Puna, bringing the mid-1976 inventory of housing units in the District to approximately 2,900.^{1/} This rate of increase in housing is greater than the growth rate in the District's population, so the ratio shown in Table 6 is even more favorable now.

And, if recency of construction is a reliable indicator of quality, the level of average quality should also be rising in Puna. In 1976 over one-third of the units were less than six years old; about half less than 16 years old. Only about 5 per cent were judged to be in poor condition structurally; less than 3 per cent lacked complete plumbing and kitchen facilities.^{2/} (By way of comparison, the 1970 U.S. Census of Housing indicated that 5.6 per cent of all housing units in this state then lacked standard plumbing equipment.^{3/})

The supply of housing in Puna, then, seems reasonably adequate for the near term -- enough to support any modest increase in population which might accompany a limited economic expansion of the District. Since an even larger supply of housing lies in Hilo and along the roads connecting the county capital with Puna, all within a commuting range of less than one hour, it is difficult to see any likely shortage of housing if geothermal development were to occur.

However, the social support structure needed to serve an increasing population may present different demands, even if the supply of housing itself is adequate. New housing areas must be served by connecting roads and perhaps public transportation; by water supply and sewage disposal systems; police, fire

1/ Based on unpublished data in files of Hawaii County Department of Planning.

2/ According to the 1976 study of the Puna Development Plan prepared by Daly and Associates for the County of Hawaii.

3/ U.S. Census of Housing: 1970, Final Report HC (1) A13, reported in State of Hawaii Data Book: 1975 (Department of Planning and Economic Development), Table 271.

and public health facilities; schools and libraries; and other infrastructure which is most efficiently -- or at least customarily -- supplied by government. These are examined next.

C. Infrastructure

Public investment in the Puna District, as measured against the amenities taken for granted in more urban areas, cannot be said to be large. Within the District, rather immediately available to the Puna population of some 8,000 persons, are the following public facilities:

1. Water supply. Only around the more built-up areas in Kea'au and Pahoa, and in the beach area around Kaimu does the Hawaii County system provide a public supply. The distribution line serving the Pahoa community presently ends about a quarter mile from the HGP-A geothermal site, and would have to be extended to serve the extensive housing subdivisions nearby, if houses are constructed therein.

2. Sewage disposal. There is no public sewage disposal or treatment facility in Puna. Residences and other habitations must provide their own septic tanks, or other methods of disposal. So will the Geothermal Project.

3. Roads and highways. There are approximately 168 miles of county roads in Puna, most of the mileage being along Highway 11, which connects Kea'au at the northern end of the District with the Hawaii Volcanoes National Park; along Highway 13, which comes down from Kea'au to Pahoa in the center of the District and then continues to the black sand beaches on the southern coast of Puna; and along Highway 132, which goes from Pahoa, past the site of the geothermal project, through the papaya-growing area near Kapoho and then to Cape Kumukahi, the easternmost point of the Big Island. The coastal road, Number 137, damaged by an earthquake in 1975, connects with the Chain of Craters road winding up to the Volcanoes National Park, but travel along that touristically important route is interdicted by recent lava flows which cover about 10 miles of the highway.

The quality of the Puna roads varies considerably. Highways 11 and 13 are generally broad and well-paved, while Highway 132 is neither in places -- for example in the area immediately bordering the geothermal drill site, where the highway is broken by an unpaved stretch of road.

4. Public transportation. Along with other readily accessible areas of the Big Island, Puna is served by a public bus system, based in Hilo, which provides twice-daily service. There are no local taxis, shuttles or U-drive companies; these are concentrated in Hilo and its airport.

5. Police and fire stations. Within Puna District, there are two fire stations, at Kea'au and Pahoa; the Pahoa station has one fireman. There is a single police station, at Kea'au. Emergencies have to be serviced from Hilo.

6. Public health facilities. There are no hospitals or clinics in Puna District. The nearest hospitals are in Hilo, less than an hour's drive from most communities in the District.

7. Schools and libraries. There are four public, no private, schools in Puna: an elementary school at Keakealani, elementary-and-intermediate schools at Kea'au and Mountain View, and a kindergarten-through-high school at Pahoa, which is relatively central in the District. The single public library in Puna is also at Pahoa.

8. Recreational areas and facilities. The one category of public facilities with which Puna is well endowed is natural recreational areas. The Hawaiian Volcanoes National Park is readily available by car. So are the beach parks: Harry K. Brown, Isaac Hale, McKenzie, Kaimu Beach, the area around Queen's Bath. Tour buses may be noisome at the black sand beaches of Kaimu and Kalapana, but seldom stop at the other beach parks. Less than a mile from the geothermal drill site is Lava Tree State Park, also not much distrubed by tourism.

In the population centers, there are five ball parks or general public parks, playgrounds at the Kea'au and Pahoa schools, and two gymnasiums open to the public. The one moviehouse in Puna is at Pahoa.

Conclusion. It would appear that any large increase in population for the Puna District would require expansion of the public water supply and provision of a sewage disposal system, if the increase were concentrated in urban-like neighborhoods, rather than spread out in detached farm areas. The big uncertainty in the development of the District is whether the presently demarcated but mostly empty subdivisions will be constructed on, or remain vacant. Geothermal development would relate to this question, but would seem to be of a second order of importance in determining the amount of population growth and, hence, the need for a public water and sewage system.

The pattern of growth, in an area as large as Puna, will obviously be of importance in determining the need for additional infrastructure investments. Should that growth center near Pahoa and Kea'au, the population may perhaps be served at a level of service acceptable to them by the existing schools, fire and police stations, the parks and playgrounds. And it is in this central area of Puna, along the rift zone, where geothermal development is most likely to occur. However, should areas zoned for subdivisions, but unimproved for want of a sufficient demand for these residential lots, be rezoned and developed for geothermally-related purposes, and should population growth move to areas more remote from Pahoa and Kea'au, there may be created a need for more social infrastructure investment, possibly including schools, playgrounds, libraries, fire and police stations, and access roads for the new housing area. In any case, it would seem that a larger population in Puna would require some local health facilities for at least emergency care before patients are transported to Hilo.

D. Economic circumstances; jobs.

i. Sugar. Historically, sugar has been the principal source of income in the Puna District. There are approximately 15,000 acres planted to sugar cane in Puna, producing between 50 and 60 tons of sugar annually, or about one eighth of total sugar production on the Island of Hawaii. Acreage has not greatly changed in recent years, but mechanization of the plantation, here as throughout the state, greatly reduced employment in the local sugar industry -- from almost 2,000 in 1940 to some 500 in 1960. Since that time, sugar employment in Puna has remained rather stable at about 500, including jobs in the Puna Sugar Company mill as well as in field operations.

Profitability of sugar operations has varied enormously in the past few years, with a temporary boom in sugar prices on the U.S. and world markets in 1973-75 being followed by a precipitous drop in 1975-76. There continues to be great uncertainty concerning the long-run prospects for sugar production throughout Hawaii.

ii. Papaya. During the past decade other categories of agricultural output have become economically significant on Hawaii and particularly in Puna. The largest element of diversified agriculture locally is the growing of papayas for markets on the mainland and abroad, as well as in the state. Almost 90 per cent of total papaya production in the state comes from Puna. According to the Hawaii State Department of Agriculture, between 1970 and 1976 the area planted to papayas in Puna increased from some 1,000 acres to approximately 1,800 acres, and the value of Puna papayas which were sold rose from \$2 million to over \$5 million. When that value is compared with the annual gross value of the Puna sugar crop (as unprocessed cane) -- which ranged from about \$5 million in 1970 to some \$24 million in the unprecedented boom year of 1974 but now again approximates the 1970 level -- it will be seen that papayas will challenge the primacy of sugar production in Puna unless sugar prices are reflatd.

Patterns of employment in papaya are quite different from those in sugar. Due to mechanization and unionization, sugar employment is quite stable, with little seasonality and little turnover in jobs. The new papaya "industry", on the contrary, employs almost as many seasonal (late spring, early summer) workers as it does full-time, year-round workers. In the past year approximately 500 persons were employed in papaya growing, harvesting and processing in the Puna District, about the same total as for sugar, but representing only about half as many man-hours.

Despite some difficulty in retaining workers, many of whom are not unionized, and problems of getting dependable airline scheduling from Hilo to the West Coast and mid-continental markets, papaya production in Puna has been profitable and acreage planted to papaya is expected to continue increasing. Since heat is used to process both fresh papaya and juices, jams, purees made from the fruit, the papaya industry may be stimulated by the availability of geothermal water.

iii. Other agriculture. The production of macadamia nuts, marketing guavas and raising antherium and orchids are also of economic significance in the Puna District. Great expectations for profits from macadamia nuts have been only modestly realized, at least in Puna where the sales value of this high-priced delicacy fell from \$1.7 million in 1970 to \$0.8 million in 1973, according to the Hawaii State Department of Agriculture. A recovery in the following years regained the million dollar level, but market resistance to higher prices, increased foreign competition and continued problems in the now-mechanized harvesting process raised questions concerning further expansion of production and jobs in this specialty area. Peak season employment in Puna by C. Brewer and Co., based in Kea'au, is somewhat under 300, with even a greater seasonality of work than for papaya.

Guava production, highly touted for the Big Island in the 1950's, has gained a modest base in Puna, where approximately 75 acres are cultivated for

this tropical fruit, most of it to be processed into juice or preserves for bottling, canning or freezing. With improved efficiency in production and market promotion, an expansion of this base of operations may well be realized, but the impact on employment in Puna would be quite limited. A small number of self-employed persons work the orchards year-round and on a part-time basis; harvesting is done mostly by students and other casual workers. Establishment of a processing plant, should the level of production and the availability in Puna of geothermal water justify one commercially, would establish some year-round and seasonal jobs.

Oranges and other citrus fruit have been planted in Puna for commercial marketing but the enterprise has not been successful, largely because the fruit doesn't match the cosmetic standards established by the fruit industry of California and Florida, but also because of the heavy seasonality of production and the non-availability of facilities for making and freezing juice. Many of the orchards are now out of cultivation, but might be brought back if a local fruit-processing industry were to be stimulated by a geothermal water supply.

More successful has been the cultivation in Puna of tropical plants for the commercial market, particularly antheriums and orchids. The proximity of the Hilo airport, which not only creates an immediate market in the local tourist trade but also ensures ready connection with markets in Honolulu, on the Mainland and in Japan, has greatly raised the demand for these horticultural specialities. Puna now supplies well over half of the total commercial production of antheriums for the entire State, and approximately 90 per cent of Big Island production. Despite large increases in output -- an approximate trebling of sales between 1964 and 1974 -- the "industry" has remained essentially one of family enterprise with part-time employment of workers outside the family. In 1975, it was estimated that about 330 people were employed in

cultivating, picking, packing and wholesaling antheriums in Puna, with a projected growth of 20 to 30 jobs per year as the marketing of this flower retains its healthy growth.^{5/}

Orchid cultivation for the market in Puna is in a much earlier stage of development than in growing antheriums. Several small orchid farms are in production in the District, but nurseries for more intensive and better controlled cultivation have been established only recently. These, like the antherium enterprises, are mostly family businesses, employing in all fewer than 50 people. Good growing conditions and a large potential market is expected to stimulate more production in Puna, but starting from such a small base the additions to employment and income to be derived from this activity must be expected to be small.

Table 7 presents a recent census of employment for Puna by industrial occupation. It is informative, but requires explanation to make it square with employment data presented above. Agricultural jobs, estimated for sugar, papaya, macadamia nuts, etc., would come to far more than the 718 shown in the table for "Agriculture". The table, using U.S. Census categories, puts jobs in sugar mills and food processing plants under its own rubrics, and so many of them in this instance may be under "Manufacturing", which helps explain the relatively large percentage under that classification.

The table does clearly show that Puna includes many people who have urban-related employment, as in the stores, offices and schools of Pahoa and Kea'au, those who commute to jobs in the hotels and shopping centers of Hilo, or who work in the filling stations along the highway. The unexpectedly large percentages

^{5/} Estimates are by Daly and Associates, in preparing their Puna Community Development Plan (1976).

TABLE 7

EMPLOYMENT OF PUNA RESIDENTS, BY INDUSTRY

<u>INDUSTRY</u>	<u>NUMBER</u>	<u>PERCENTAGE DISTRIBUTION</u>
Agriculture	718*	24.9%
Fishing, Hunting	12	0.4
Construction	502	17.4
Manufacturing	309	10.7
Transportation, Communications, Utilities	228	7.9
Retail/Wholesale Trade	548	19.0
Finance, Insurance, Real Estate	101	3.5
Service (including government)	<u>467</u>	<u>16.2</u>
Total	<u>2,885</u>	<u>100.0%</u>

* May exclude some employment in sugar, papaya and macadamia nut processing.

Source: Office of Economic Opportunity Census Update, County of Hawaii (1976), unpublished, as reported by Daly and Associates in Puna Community Development Plan.

under "Construction" and "Transportation, Communication, Utilities" may reflect the employment of people who live in Puna but commute to jobs in Hilo and adjacent areas.

There is no category in Table 7 for tourism. If there were, the number of positions reported would be very small, for Puna is an area which tourists traverse but spend little money in. There are no hotels, car rental agencies or touristic restaurants in the District. Tour buses and individual motorists do come down from Hilo in some numbers to see the black sand beaches and the painted church near Kalapana-Kaimu on the coast of Puna, and sometimes they stop to see the steam rising from vents in the geothermal area (and currently to see the experimental geothermal well), but after looking around they head back to Hilo without having added to the gross product of Puna. The research facility which is the subject of this E.I.S. will attract additional sightseers. A more significant economic outcome of geothermal development would be the construction of spa facilities in the area, accommodations which might particularly attract visitors from Japan, where geothermal spas are in great demand.

E. Summary

The Puna District is, by conventional American standards, relatively undeveloped. Within an hour's driving time from the capital and chief city of the county, and its international airport, Puna itself has only limited urban areas and urban facilities. Across much of its lava lands, housing subdivisions are laid out, but these yet contain few houses or construction crews. The chief sources of employment are agriculturally based, though many of its 8,000 population drive to jobs in Hilo.

There is a potential for development in the diverse agricultural activities of the District: papayas, guavas, macadamia nuts and tropical ornamental plants, as well as the historic mainstay of Puna's economy, sugar cane. The housing supply seems above average, both in quality and quantity, and should

be able to accommodate the projected population increase at least for several years. Public services, however, will be strained by a continued increase in population, including the systems for delivering fresh water and removing wastes. There may well be a need for other infrastructure expenditures, as for schools, police and fire stations, a local health service facility, etc.

However, in itself, the proposed R & D facility will have only a negligible impact. A significant geothermal development in Puna would affect, and be affected by, all of the foregoing considerations. It might compete for land with some of the agricultural uses, though the areas most promising for drilling may be too active thermally for commercial agriculture. It would create jobs, both directly and indirectly, tending to relieve local unemployment, which has been high, and also attract people from other areas. Depending on the mode of geothermal development, it could diversify as well as enlarge the base for economic activity in Puna, as by stimulating diversified agriculture and also tourism, now only a negligible source of income to the population of the District.

4. MITIGATING ADVERSE IMPACT OF PROJECT: REVERSIBILITY

Because the Hawaii Geothermal Project is limited to a single production well in a small acreage located in a relatively remote area recently subjected to lava flows, the environmental impact is not great. However, as the ensuing discussion has revealed, some adverse effects must be taken into account and mitigated.

Disposal of effluents and waste. When in operation, the well will discharge from 60 to 100 gallons per minute, after the steam and hot water are run through the generator and condensor. If allowed to flow freely, the effluent would be a dangerous nuisance, because of its heat and the undissolved minerals in the fluid. To dispose of the effluent, it will be directed to settling basins within the fenced perimeter of the project area; there it will be absorbed in the highly

porous cinder/lava surface and then percolates through the underlying strata into the geothermal reservoir below. As previously noted, there is no fresh water lens below the well site -- if there is one adjacent, it is apparently blocked off by dikes of basalt rock at the southern boundary of the East Rift

Zone.^{1/} Because of the relatively large silica content of the geothermal water, the settling basins will be backhoed as they are coated over to restore the porosity of the surface and the silica deposits removed -- perhaps to be used as fill.

Wastes of the persons working at the site will be disposed of by a cistern or chemical system installed for that purpose.

Noise. The installation of a generator will itself reduce the noise level of the well, since the escaping steam will be channeled through turbines and a condensor, and this equipment in turn will be enclosed within the walls and roof the generating station. The existing separator/muffler will continue to function; its capacity will be increased during test runs of the well prior to installation if necessary to hold down the noise to decibel levels already experienced at the project.

Smell. Tests by the Hawaii Geothermal Project and by the State Department of Health have demonstrated that the gases from the well are not hazardous, but -- as with the effluents naturally vented within the Volcanoes National Park -- they do smell. The irritant particularly is hydrogen sulfide (H_2S), whose rotten egg odor is enjoyed by few people. The human nose is extremely sensitive to this element: the threshold recognition level is approximately 0.0005 parts per million, whereas the health hazard threshold is 10.0 ppm.

To hold the discharge rate of H_2S down to a level that will not offend persons living near the project, a system of scrubbers will be installed with

1/ This is the conclusion reached by Harold T. Stearns in his report on The Geothermal Well Field in the Puna District, Hawaii, dated April 4, 1977.

the generator. Several techniques are available: absorption by an oxidizing agent; adsorption by activated charcoal; direct combustion or catalytic after-burning; condensation; etc. A scrubbing system will be selected from these alternatives and incorporated into the facility.

Visual impact. The most conspicuous element of the geothermal research and demonstration project will be the cooling tower, some ____ feet high, necessary for efficient operation of the generator. The low building sheltering the wellhead generator and condensers will be screened by a wooden fence and perhaps by shrubbery, if plantings are feasible. The fence and cooling tower will be of colors selected to best blend in with the surrounding terrain -- essentially dark gray lava with sparse covering of green plants and light gray-green lichens. The cooling tower will be set back from the road to minimize its impact on the environment.

Parking will be off the adjacent Pohoiki Road so as not to present a problem to vehicular traffic on that county road, presently not heavily used.

Reversibility. The installation of a wellhead generator and provision of demonstration facilities is, as far as commitment of natural resources goes, essentially reversible. If required or warranted, the generator can be removed, the cooling tower and other equipment dismantled, the well sealed. The consequences would be economic, more than environmental, for a capped well is of no use whatsoever, and a used generator may cost more to move than it is worth. The lava land of Puna, stripped of the surface components of the project, would soon regain its natural state as the ambient ground cover once more took over, leaving only the covered wellhead to mark the site.

5. SOCIAL BENEFITS AND COSTS OF GEOTHERMAL DEVELOPMENT

The environmental impact of a project limited to the present experimental geothermal well (HGP-A) is demonstrably trivial. HGP-A has already been tested repeatedly and the only untoward results have been some loud noise, which will

be muffled, and some smell from the emission of H_2O , which will be scrubbed when testing is resumed. The installation of a small wellhead generator and conduct of a research and demonstration program on the Puna site should not have any profound effect on the environment.

More significant are the possible outcomes of a geothermal resource development stimulated by the project, a development requiring many wells and perhaps a much larger generating station. This section therefore considers the benefits and costs of geothermal development in Puna at large, and not merely the impact of HGP-A.

Any new power source can become the genie released from the bottle. Who could have written an adequate environmental impact statement about the first oil well in Pennsylvania, or about the first controlled use of nuclear energy at Chicago's Stagg Field? Any yet it is rational policy to require an assessment of potential new departures, such as geothermal energy, so that human foresight can be directed, within its short range, to the maximization of benefits from the projected development and to the avoidance of harm. Without pretending to envision the ultimate impact of geothermal development on the Island of Hawaii, it is possible to array the benefits and costs likely to be experienced over the first decades of developing geothermal resources, as at Puna.

A. Potential Social Benefits

i. An Indigenous Energy Source

Hawaii is most vulnerable to the recurrence of an oil crisis, such as that which temporarily sobered the nation in 1974-75, and to continued increases in the price of petroleum. Every other state either has its own energy supplies (Alaska) or is connected to a regional power grid which can be fed at many points with oil or alternative fuels. Non-contiguous Hawaii presently has neither its own fuel supplies nor connections to depend on, should the importation of oil into this State be halted or become too expensive.

More than any other state, therefore, Hawaii has reason to seek energy sources within its own boundaries, and currently, in different stages of advance, searches are underway for means of tapping a variety of indigenous power sources. These include solar energy, wind energy, ocean thermal energy, energy from biomass conversion, and geothermal energy. While solar energy is already used on a small scale for heating domestic water supplies, the utilization of geothermal energy offers the technology most advanced for supplying other energy needs (outside the sugar industry, where the burning of bagasse is an efficient means of generating power for the plantation mills and the communities around them).

An indigenous power source, such as geothermal, would substitute for oil, which continues to rise in price. The potential gain is not only in holding down costs, but also in reducing economic uncertainty. After the 1974 oil embargo by the OPEC nations, all large users of oil-fed energy must take into account the possibility that without notice their power may be cut off, reduced or drastically increased in cost. The possibility pervades the economic climate, reducing incentives to invest in energy-intensive enterprises, stimulating the construction of oil-storage facilities and the substitution of less-energy-using methods for energy-intensive technology. These reactions may be patriotic and, given the uncertainty of supply, perfectly rational, but they do come at a cost. An indigenous energy source, if commercially feasible, could more effectively reduce dependence on imported oil, and at a lower economic price.

ii. Economic Growth; More Jobs; More State Revenues (Eventually)

In itself, geothermal power development need not be a sustaining source of either economic growth or job creation. Initially, as wells were being drilled and production facilities at the field were being built for a new geothermal facility, the construction industry would be stimulated. However, following the construction phase, if the only application of the geothermal

resource were to be the generation of electricity, the economic significance of the development would be extremely limited. Since power stations are highly automated, only a few workers would be employed at a geothermally powered generating plant in Puna. They could benefit, and so could the owners and customers of Hawaii Electric Light Company, but in all likelihood, the gains would be too small to be visible in the economy of the State.

More significant economic and employment effects would depend on the applications made of geothermal power. In the event that large amounts of electricity were generated, and at a cost considerably below that from burning fuel oil, it is possible that new enterprises in number would be attracted to the Big Island, and that existing enterprises might be expanded sufficiently to create many new jobs. Alternatively -- or simultaneously -- firms which use geothermal water directly (such as fruit processing, wood and paper production and other applications (such as therapeutic spas) might be clustered at the geothermal field, providing employment visibly connected with the new energy source.

Direct and indirect stimulation of employment would be particularly beneficial to Puna. Unemployment rates in the District during the past few years have averaged about 10 per cent, among the highest in the State. Unless the prices and profitability of the local sugar industry are reflatd, the shrinkage of the plantations may be suddenly accelerated and in Puna -- and generally on the Island of Hawaii -- that would threaten a major source of jobs and income. A diversification of agriculture and agriculturally-based industry, stimulated by geothermal development, may well be timely in the next decade.

Conceivably, the economic activity generated from geothermal development on the Island of Hawaii might benefit the public sector, as well as the private. In addition to royalties which the State would receive from the

geothermal deposits which it has reserved, State and County tax revenues would be increased by a geothermal industry, as land values in and around geothermal fields rose and taxable buildings and other improvements were put into place; gross income stemming from the fields and from productive facilities powered by geothermal energy would be subject to the State's general excise and electricity sales to the public utility tax; profits and salaries from the geothermal "industry" would be taxed under Hawaii's corporate and personal net income taxes. By the operation of the multiplier, income streams created by the geothermal industry would feed into the overall economy of the State, generating additional tax revenues with the re-spending of each geothermal dollar.

However, during the remainder of the 20th century, net government income from geothermal development in Hawaii is not likely to be forthcoming. It is more probable that, at least for several years, the development of geothermal resources will require investment by the State government and its counties at a level which will exceed the tax revenues from this new source. Already, the State and County of Hawaii have granted \$700,000 for the experimental well. Even if no additional financial support is given for drilling wells, it is likely that any significant economic development stimulated by geothermal exploitation will also stimulate outlays by the state or county governments. These may either be in direct support of geothermal utilization (such as access roads to the geothermal fields, harbor improvements to accommodate ships bringing manganese nodules to a geothermal refinery), or the infrastructure investment (water supply, waste removal systems) mentioned in Section 3 as being necessary to support population growth in the Puna District.

After geothermal development is well underway, the industry established and the infrastructure in place, the development should turn into a net revenue producer for the governments which have fostered it. That, however, is a long-term prospect, one for the twenty-first century.

iii. Decongestion of Population

The creation of jobs in an expansion of the Big Island's economy powered by a new energy source could help implement the announced policy of the State administration to reduce the concentration of population in and around Honolulu. Despite the enunciation of this policy at the beginning of this decade, Oahu continues to hold more than four-fifths of the population of the State, with no viable program for reducing the congestion of the capital city.

It is unlikely that development of a geothermal resource in itself, unless the field were unexpectedly huge, would provide such massive employment as to cause the transfer of many people to the Big Island. And it may well be that the Big Island would not welcome a large in-migration. However, a major geothermal development could fuel a general economic growth -- in agriculture, industry and tourism -- which the authorities of Hawaii County would either welcome or be unable to control. How much of this hypothesized growth would be reckoned a plus for the Island of Hawaii is a question of values, but, should it occur, it would increase the gross State product and, perhaps, would marginally reduce crowding on Oahu.

iv. Environmental Effects: Geothermal versus Other Energy Sources.

It is not likely that geothermal development would improve the physical environment. In Section 2, it was concluded that drilling HGP-A has not had much impact, and that the limited environmental effects of installing a generator and other facilities to test the geothermal resource could be limited by muffling, scrubbing, landscaping, etc. However, a development stimulated by the R & D project would be of much greater environmental significance, and there may well be people in the community who would prefer to leave Puna, and other potential development sites, unchanged, or not changed in this way.

Presented with a choice between geothermal development and allowing no change in the environment, many persons might prefer the status quo. Realistically,

however, that is not the choice which will confront the people of Hawaii. Given the strong probability that oil resources will become extremely scarce by the end of this century, it is most likely that some energy source will displace oil, or that only grades of oil with high sulfur content will be available at an affordable price.

If the alternatives available for Hawaii's future energy needs should be limited to what is now technically and economically feasible, the choice would be between more polluting oil, coal, nuclear power, and geothermal energy. With these alternatives in view, a rational choice on environmental grounds could well go to geothermal energy, which is much less polluting than coal or other hydrocarbons, and less dangerous than nuclear power. In this sense, as one of the least polluting power sources, geothermal resource development would be a positive factor for preserving the environmental quality of Hawaii.^{1/}

B. Potential social costs and their minimization

The opportunity costs of using geothermal resources will probably be relatively low. The lands around the rift zones of Kilauea which seemingly overlay the hot water are frequently picturesque but seldom of much economic value. Only a small portion of these lands are in cultivation, and use of the terrain for housing is limited by many factors, not least of which is the tectonic activity of the area: it was subjected to a destructive earthquake as

^{1/} In the judgment of persons serving on the investigatory groups which prepared the report on Alternative Energy Sources for Hawaii for the State Advisory Task Force on Energy Policy (University of Hawaii and Department of Planning and Economic Development, 1975), geothermal energy was preferable with respect to environmental impact over land-based use of coal, specifically in their relative impact on water and air and in the discharge of solid wastes. An ocean-based coal power station or the burning of liquified coal rated slightly better than geothermal energy in the opinion of the three persons serving on the task force on the environment, while in the opinion of some 50 people who served on the alternative energy source task forces, geothermal power was preferable to coal, however utilized. (Op. cit., pp. K-3 and 4)

recently as November 1975. Lands utilized in a geothermal field within Puna are not likely to be taken from any highly productive alternative use.

If geothermal wells penetrated an extensive Ghyben-Herzberg lens, then there would be danger of paying a high cost in endangering the local groundwater supply. However, as stated above in Section 2, the experience from well-drilling in the Puna area does not seem to indicate the existence of a fresh water lens. For such fresh water reservoirs as may be encountered, appropriate well-casing programs and well maintenance should be able to guard against polluting groundwater otherwise usable for household needs or irrigation.

Other environmental pollution, which might add to the social costs of geothermal development, can be held to a minimum by appropriate safeguards. At the HGP-A well, mufflers are used to reduce the noise of steam issuing from the wells, landscaping will limit visual intrusion, constant monitoring ensures that noxious gases or particulates do not exceed safe maxima. In a future production field, effluents can be reinjected into the reservoir after passage through a closed system, to minimize the environmental impact of using the geothermal resource.^{2/}

More likely to be an obstacle to geothermal development than the costs of environmental protection is obtaining the investment capital necessary for creating a production field and application of the resource to productive usages. The magnitude of such investment is considerable: it will cost tens of millions just to create a medium-sized electric power facility. How to raise such funds for an investment as inherently risky as drilling wells into hidden subterranean reservoirs will present the first economic barrier to geothermal exploitation.

^{2/} A framework for environmental oversight is provided in the regulations on geothermal drilling which were in the process of being adopted by the Hawaii Department of Land and Natural Resources at the time of this writing.

-10-

If grants or low-interest loans can be obtained from the national government (the Energy Research and Development Administration has a loan program just getting well underway), the drain upon Hawaii-based capital -- and hence the opportunity costs of the investment to the Hawaii economy -- can be kept down. Attracting investment capital from the mainland U.S. or abroad could have a similar effect in terms of opportunity costs, but would raise questions of out-of-state control over the geothermal development and possibly increase the out-of-state flow of funds generated by a successful development.

A kind of economic cost which is unique to resources tapped by wells -- that is oil, gas, water and geothermal resources -- is waste through competitive exploitation. Since the reservoirs holding these subterranean resources frequently underlie lands held by more than one party, there is a temptation for competing enterprises to drill as many wells -- either straight down, or slanted under adjacent properties -- as will maximize their share of the output. However, such drilling programs may not maximize total output from the field. On the contrary, by puncturing the reservoir excessively, it may cause a loss of pressure which leaves below the surface, unrecoverable except with costly techniques, some of the resource which a more efficient drilling program could have tapped with fewer wells.

By its policies and regulation, the State of Hawaii can restrain inefficient modes of exploiting a geothermal field. The proposed rules of the Hawaii State Department of Land and Natural Resources relating to geothermal wells allow for unit, or cooperative, development of a geothermal pool by several drillers, but do not require this approach to resource conservation. It may be that the limited facilities and expertise for deep drilling in Hawaii will make for a monopoly in development of the resource, but if not, the losses from uneconomical, beggar-thy-neighbor exploitation could be significant.

C. Summary

Geothermal energy offers potential benefits to Hawaii, which given this state's virtual complete dependence on oil, are of importance to its economy. Reducing this utter dependence by substituting indigenous geothermal water for imported petroleum to fuel the generation of electricity would not only reduce cash outflows (and perhaps hold down the price of electricity) but would lower the present uncertainty of continued reliance on oil from overseas suppliers.

However, a geothermal development limited to a small or medium size (say 50 MW) electric generating plant, would not have much impact on the Hawaii economy. A substantial economic impact might result from a generating facility large enough to bring down the cost of electricity and stimulate many industrial applications on the Big Island (or, when technological breakthroughs permit, the export of energy to industrial markets off the Island). Multiple use of even a limited geothermal resource might create in agriculture, industry and tourism a significant number of jobs, not to be expected from an automated generating plant itself.

An increase in job opportunities on Hawaii would help the State to implement its announced policy of avoiding further congestion of population in and around Honolulu. Geothermal development and associated economic growth in Puna would require the construction of water supply and waste disposal systems, plus other infrastructure, to serve a larger population. Such public costs would offset, perhaps exceed, additional tax revenues generated by an economic expansion based on geothermal production. Only after many years is it to be expected that the royalties received on State mineral leases, plus the taxes on geothermally-stimulated business, would exceed the cost to the government of preparing the way for and perhaps participating in the development of the new resource.

6. ALTERNATIVES TO PROPOSED ACTIONS

The question of alternatives to the proposed research and demonstration project for geothermal energy may be construed in two ways. The first is "What alternatives are there to this new energy source?" The answer to this question is expanding the use of petroleum, on which Hawaii is now so heavily dependent, or seeking other substitutes for petroleum. Those substitutes which seem technically possible for Hawaii include solar, ocean thermal, wind and biomass-derived energy, among indigenous sources, and coal and nuclear energy, among the non-indigenous sources.

On environmental as well as economic grounds, it seems preferable to secure indigenous energy sources, and such is the policy of the State of Hawaii. Among the indigenous sources, geothermal power is at a stage of development most advanced for the production of commercial and industrial power, as contrasted with the application of solar energy for heating domestic water supplies, a technology already in use for that limited purpose. Geothermal energy is not considered an alternative to ocean thermal, wind or biomass energy, in the sense of a complete substitute. Rather, they are complementary modes of energy production which together may significantly reduce Hawaii's dependence on imported oil.

The second construction of the question is "What alternative sites have been considered for this geothermal research and development project?" Before the well, HGP-A, was drilled, University of Hawaii geophysicists studied the Big Island over the course of two years. They selected the drill site as that most likely to tap a geothermal reservoir within the areas open for such drilling. (Locations within the Hawaii Volcanoes National Park and built-up areas were excluded from consideration as being unavailable.) The success of that drilling now limits the R & D project to the area of the well, for it

would be costly, inefficient and environmentally disruptive to pipe the steam and hot water any distance from HGP-A.

In summary, the alternatives to the proposed action is to abandon geothermal testing or to do it at a place removed from the present well. Abandonment would slow down or possibly end the development on the Island of Hawaii of geothermal energy. An immediate consequence would be the construction of another oil-burning generating plant by the Hawaii Electric Light Company. A long-range consequence would be to increase the likelihood of bringing in coal-burning or nuclear power stations by the end of the century, if oil supplies prove to be as scarce and expensive by that time as is widely predicted.

7. CONTROLLING FUTURE GEOTHERMAL DEVELOPMENT

The research and demonstration project which is the subject of this E.I.S. will in itself have minor environmental effects, but if it is successful in its purpose of stimulating the development of a new energy source the environmental consequences would be much more significant. The state and county governments are therefore concerned over what controls they may have on a nascent geothermal "industry": are there adequate mechanisms available to them to check unwanted directions or degrees of its development?

The adequacy of any governmental controls obviously depends on the energy and skill with which they are applied, but it is evident that there is no dearth of control points.

A. Controlling Geothermal Uses of Land

Land Use Law (Chapter 205, Part I, HRS)

Most of the lands around the project are classified as "agricultural". To use such land for drilling or producing from geothermal wells, the owner or operator must obtain a special use permit from the County Planning Commission, subject to approval by the State Land Use Commission. Should either level of government wish to direct or stop a given geothermal project, it has the means

at hand in the special use permit process -- subject to appeal to the courts if permission is unreasonably withheld, but with a burden on the applicant to show the unreasonableness of government action.

If geothermal development is proposed for watersheds, forested areas or other lands classified as "conservation", permission must be granted by the State Department of Land and Natural Resources, which has control over areas so classified. The subzone called "General Use" admits uses "not detrimental to a multiple use conservation concept", which might include geothermal wells, but the DLNR would have to be convinced.

Shoreline Setback Law (Chapter 205, Part I, HRS) and Environmental Shoreline Protection Law (Chapter 205A, Part II, HRS)

Should geothermal drilling be proposed close to the ocean, this law applies controls. Within 40 feet of the shoreline, the State Land Commission has power to control land use to minimize impact on natural shoreline processes. Counties are authorized to place setback lines and special management areas further inland, and to adopt rules and regulations intended to provide environmental protection.

B. Environmental Controls

State Environmental Quality Control Law (Chapter 343, HRS)

Under the statute, any project on conservation lands, within a shoreline setback area, one proposing an amendment to County general plans, or a project using State or County lands or funds, must submit and obtain approval by the Environmental Quality Control Commission of an environmental impact statement. Notice is given to public agencies, as well as interested private parties, who may voice their objection to any aspect of the project.

National Environmental Quality Control Law (PL 91-190)

If federal funds are used on a project, it may also be subject to a federal E.I.S. Such was the case with the drilling of HGP-A, since much of

the funds were provided by the National Science Foundation and then the Energy Research and Development Administration (ERDA). It is not clear if a private geothermal enterprise, using loan funds guaranteed by ERDA, would be so subject.

C. Controlling Access to Geothermal Resources

State lands. The State of Hawaii holds title to large parcels of land -- approximately _____ per cent of the area of Hawaii County, for example -- and as landowner the government can control access to geothermal reservoirs underlying its holdings.

State mineral rights. Since the Great Mahele, the government of Hawaii has reserved to itself rights to minerals beneath many parcels granted to private owners, and by Act 241 of the 1974 Legislature, geothermal resources are defined as mineral. Under Chapter 182, HRS (Reservation and Disposition of Government Mineral Rights) the Department of Land and Natural Resources may issue leases to drill geothermal wells on private lands where mineral rights are reserved, as well as on state-owned lands. Conditions for getting and using geothermal leases are set down in rules and regulations relating to geothermal operations recently promulgated by the Department of Land and Natural Resources. The rules are concerned with environmental safeguards and protecting the productive capacity of geothermal reservoirs, as well as safety and economic regulation.

D. Other Government Controls

General plans. The Hawaii State General Plan (1977 draft) encourages the development of indigenous energy sources, but as yet has no specific developmental plan or criteria for geothermal energy. A section on geothermal development in the State General Plan and in the plan of the County of Hawaii could set objectives and boundary conditions which would be helpful to the Department of Land and Natural Resources, the Land Use Commission, the County Planning

Commission, and other public agencies which have to respond to initiatives for geothermal development.

Public finance measures. The pace, if not the direction, of geothermal development can be influenced by discretionary fiscal action available to the State government. It may accelerate development by setting at low levels the royalty payments it may collect on state-owned geothermal deposits, by giving special tax considerations (especially under the property, net income and general excise taxes) to geothermal companies, by providing access roads, water supply, sewage disposal and other infrastructure investment in support of new geothermal fields. Such indirect -- and conceivably direct -- subsidies could be conditioned upon the State's satisfaction with private development plans, but not tax incentives, which must be offered to all comers.

8. LIST OF NECESSARY APPROVALS

Department of Land and Natural Resources

Department of Planning and Economic Development

University of Hawaii

County of Hawaii

Selected Excerpts from "A Geothermal Electric and
Non-electric Research Facility Utilizing the
HGP-A Well on the Island of Hawaii," a Proposal made to the
Energy Research and Development Administration by the
HGP-A Development Group on April 6, 1977

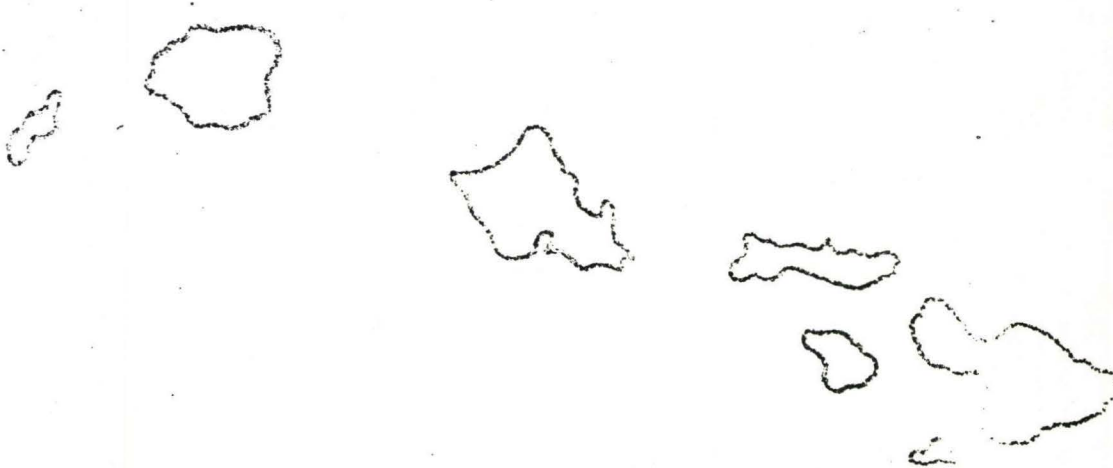
EXHIBIT A-9

A GEOTHERMAL
ELECTRIC AND NONELECTRIC RESEARCH
FACILITY UTILIZING THE HGP-A WELL
ON THE ISLAND OF HAWAII

Volume I: Technical

A PROPOSAL TO
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
DIVISION OF GEOTHERMAL RESEARCH

April 6, 1977



THE RESEARCH CORPORATION
OF THE UNIVERSITY OF HAWAII
FOR THE HGP-A DEVELOPMENT GROUP

CONTENTS

	Page
1. SUMMARY	1-1
2. INTRODUCTION	2-1
3. TECHNICAL APPROACH	3-1
3.1 General Project Requirements	3-7
3.1.1 Surface Characteristics	3-11
3.1.2 Reservoir Characteristics	3-11
3.1.3 Fluid Characteristics	3-12
3.1.4 Wellhead Power Conversion System	3-14
3.1.5 Test Facility Design	3-17
3.1.6 Support Facilities	3-21
3.1.7 Operational Training	3-21
3.1.8 Environment and Plant Siting Permits	3-22
3.2 Detailed Projects Requirements and Analysis	3-23
3.2.1 Surface Characteristics	3-23
3.2.2 Reservoir Characteristics	3-26
3.2.3 Fluid Characteristics	3-32
3.2.4 Wellhead Power Conversion System	3-38
3.2.5 Experimental Power and Non-Electric Research Facility	3-81
3.2.6 Support Facilities	3-102
3.2.7 Operational Training	3-115
3.2.8 Plant Siting Permits and Environmental Constraints	3-116
3.3 Conceptual Design of Research Facility	3-121
3.3.1 Facility Plot Plan	3-121
3.3.2 Facility Flow Diagram	3-125
4. MANAGEMENT PLAN	4-1
4.1 Project Organization and Work Subdivision	4-1
4.1.1 Project Organization	4-1
4.1.2 Project Work Organization	4-1
4.1.3 Project Detailed Schedule	4-7
4.2 Design and Implementation Phase Management	4-8
4.2.1 Project Planning and Control	4-8
4.2.2 System Quality	4-8
4.2.3 Bidders List and Subcontractor Analysis	4-13
4.2.4 Liaison with ERDA	4-14

CONTENTS (Continued)

	Page
4.3 Phase 2 (Construction) Project Management	4-15
4.3.1 Project Monitoring and Control	4-15
4.3.2 Configuration/Quality Control	4-15
4.3.3 Material Procurement and Subcontract Management Plan	4-15
4.4 Operating Phase Management	4-17
4.4.1 Geothermal Power Plant	4-17
4.4.2 Research and Test Facility Management	4-17
5. STATEMENT OF WORK	5-1
5.1 Design Phase	5-2
5.2 Design Phase Deliverables to ERDA	5-6
5.3 Construction Phase	5-6
5.4 Construction Phase Deliverables	5-9
6. RELATED EXPERIENCE	6-1
7. RELATED PERSONNEL CAPABILITIES	7-1
8. REFERENCES	8-1

1. SUMMARY

The successful production of 4 MWe equivalent steam and hot water from the HGP-A well justifies past R&D expenditures by both federal and state governments. The original ERDA objectives of exploring for and finding geothermal energy sources in a young volcanic environment have been achieved. The next step in directed R&D can now be taken: that of assessing the engineering and financial risks involved with long term energy production from this typical young volcanic energy resource. The proposed geothermal research station will be used to test both commercialization potential and geothermal R&D concepts as the next progressive step toward economically and environmentally sound production of geothermal power.

Continuation of the R&D initiated by the Hawaii Geothermal Project can be directly related to achievement of the National Geothermal Goals; to advance development of alternative energy resources in the State of Hawaii; and to establishment of operational risk levels to the commercial sector. This is the subject of this proposal to ERDA. Because each section, Federal, State, and Commercial, stands to benefit from R&D using the HGP-A well, each should contribute resources toward achievement of defined objectives. The Research Corporation of the University of Hawaii (RCUH) will serve as the legal and fiscal agent for the HGP-A Development Group (HGP-A/DG) consisting of the State of Hawaii, the county of Hawaii, the University of Hawaii, and the Hawaii Electric Light Company (HELCO). With RCUH acting as the management entity and point of contact for ERDA, responsibility is focused and ERDA will achieve maximum project visibility with minimal effort.

The concept for this proposed geothermal test station, using the HGP-A well, was derived from the prime objectives of the Federal Geothermal Program, as designated by the ERDA Division of Geothermal Energy; the objectives of the State of Hawaii, as defined by the State Department of Planning and Economic Development; and the need for operational and economic data, as defined by HELCO. The mutually beneficial objectives suggest that a geothermal research station consisting of four basic elements will benefit all participants. These elements are as follows:

- A wellhead power generation system
- A facility for R&D field experiments including environmental factors

- Reservoir assessment by operational performance
- General housekeeping factors associated with hydrothermal systems.

The wellhead power generation system is conceived to be a small, variable electric power output unit (1 to 7 MWe) with potential for application throughout the geothermal industry where flash steam is available in the pressure/flow regime of the HGP-A well. Associated equipment, e.g., silencers, separators cooling towers, will also be tested for operational efficiency and economics.

The R&D test facility is conceived to be some test pads, with capabilities for accepting and operationally testing a variety of concepts, hardware components, and subsystems resulting from basic and developmental geothermal research.

The reservoir assessment aspects are rather specific to young active volcanos, but are indicative of the response to production and reinjection of low permeability systems which make up a significant portion of geothermal resources to be found in the western central states. Further, operational production and reinjection will greatly assist in evaluating environmental factors.

The general housekeeping factors are those functions which are required to keep any facility running smoothly. The requirements for operation and maintenance tools, personnel data, and spare parts for small wellhead generator systems are unknown, and must be understood if economic risks are to be evaluated for the industrial sector.

The methodology used to prepare this proposal and to develop the schedule of proposed activities was based on satisfying the needs of the sponsoring organizations, while satisfying the fundamental criteria associated with each of the four research station elements. Once these were determined and interface accomplished, a total system concept, Figure 1-1, evolved and a master plan for a Geothermal Research Station was established. The details of how this will be implemented is the subject of the following proposal. Estimated costs are developed in Volume II.

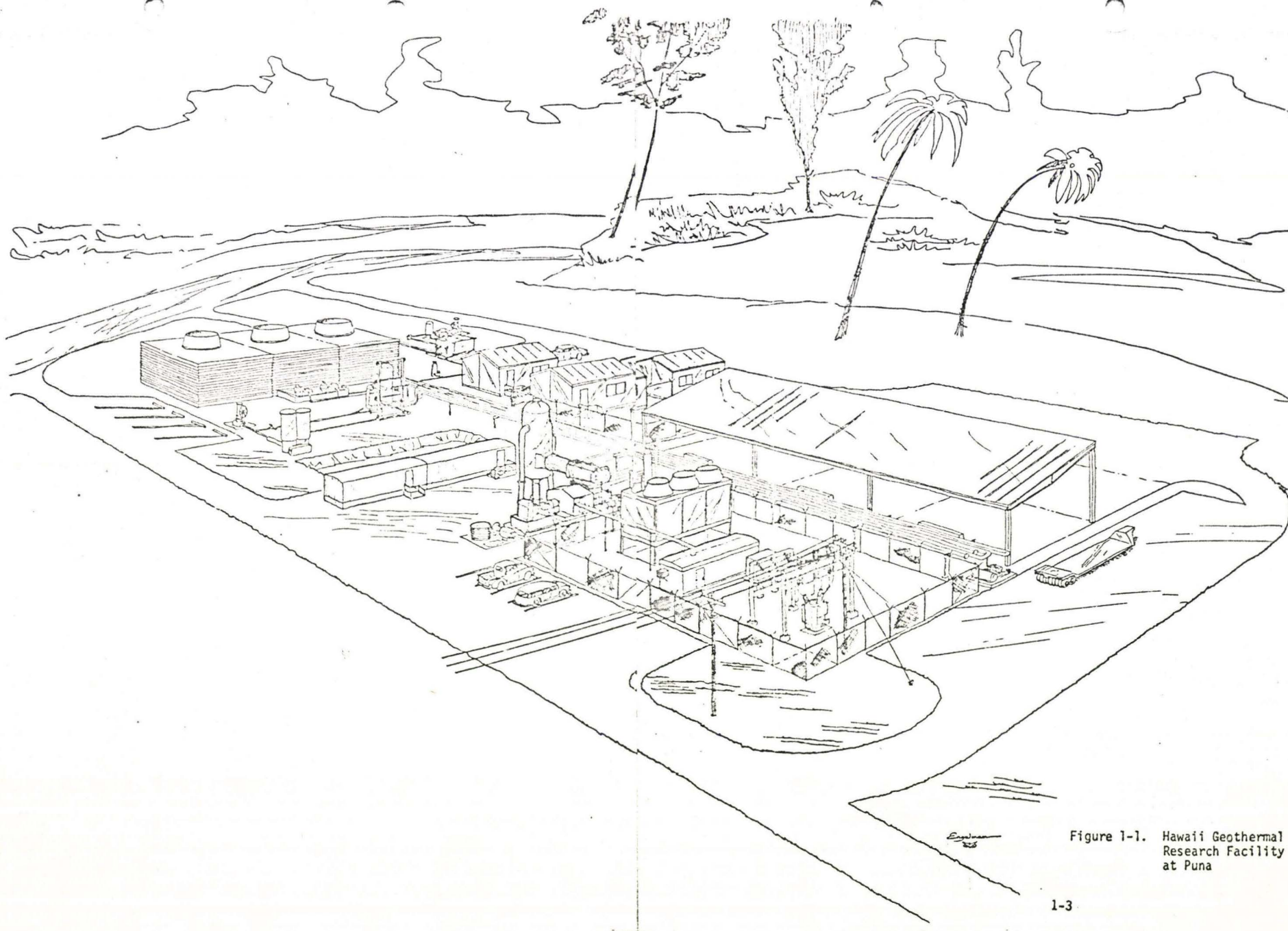


Figure 1-1. Hawaii Geothermal
Research Facility
at Puna

2. INTRODUCTION

This proposal to the Geothermal Division of ERDA for a geothermal research station on the island of Hawaii (Figure 2-1) is directed toward the utilization of geothermal resources for research that will benefit the entire geothermal community. Project support, to date, has been ERDA, the State and County of Hawaii, the National Science Foundation, Water Resources International, Hawaiian Electric Company, and other public and private groups. ERDA has provided 60% of the resources required to drill and test, a 6450 feet deep geothermal well (designated HGP-A) that produces high quality steam at a rate, temperature, and pressure equivalent to approximately 4 megawatts of electrical power.

This well is located about 21 miles southeast of Hilo on a 4.1 acre plot which has been conveyed to the State of Hawaii by the Kapaho Land and Development Company. The well is in the Pahoa geothermal field (one of three geothermal prospects on the Puna peninsula), encompassing an area of 4.7 square kilometers. A recent estimate by HGP personnel supported by estimates made by Stanford Research Institute shows the potential to be 500 MWe for about 100 years.

This proposal to ERDA is being submitted by the Research Corporation of the University of Hawaii (RCUH) acting as the fiscal and contractual agent for a group consisting of the State of Hawaii, the County of Hawaii, the University of Hawaii, and the Hawaii Electric Light Company (HELCO), which is a wholly owned subsidiary of the Hawaiian Electric Company. The executive agency of the group is the Department of Planning and Economic Development of the State of Hawaii. (See Figure 2-4).

The purpose of the group is to provide a legal entity which can engage in contracts to design, construct, install, and operate a research facility at the HGP-A well site that will serve national, state, and county interests in the development and utilization of geothermal resources. These interests encompass the involvement of private industry as one of the vehicles to make these resources available to the general public, and HELCO is in the best position to promote that objective on the island of Hawaii.

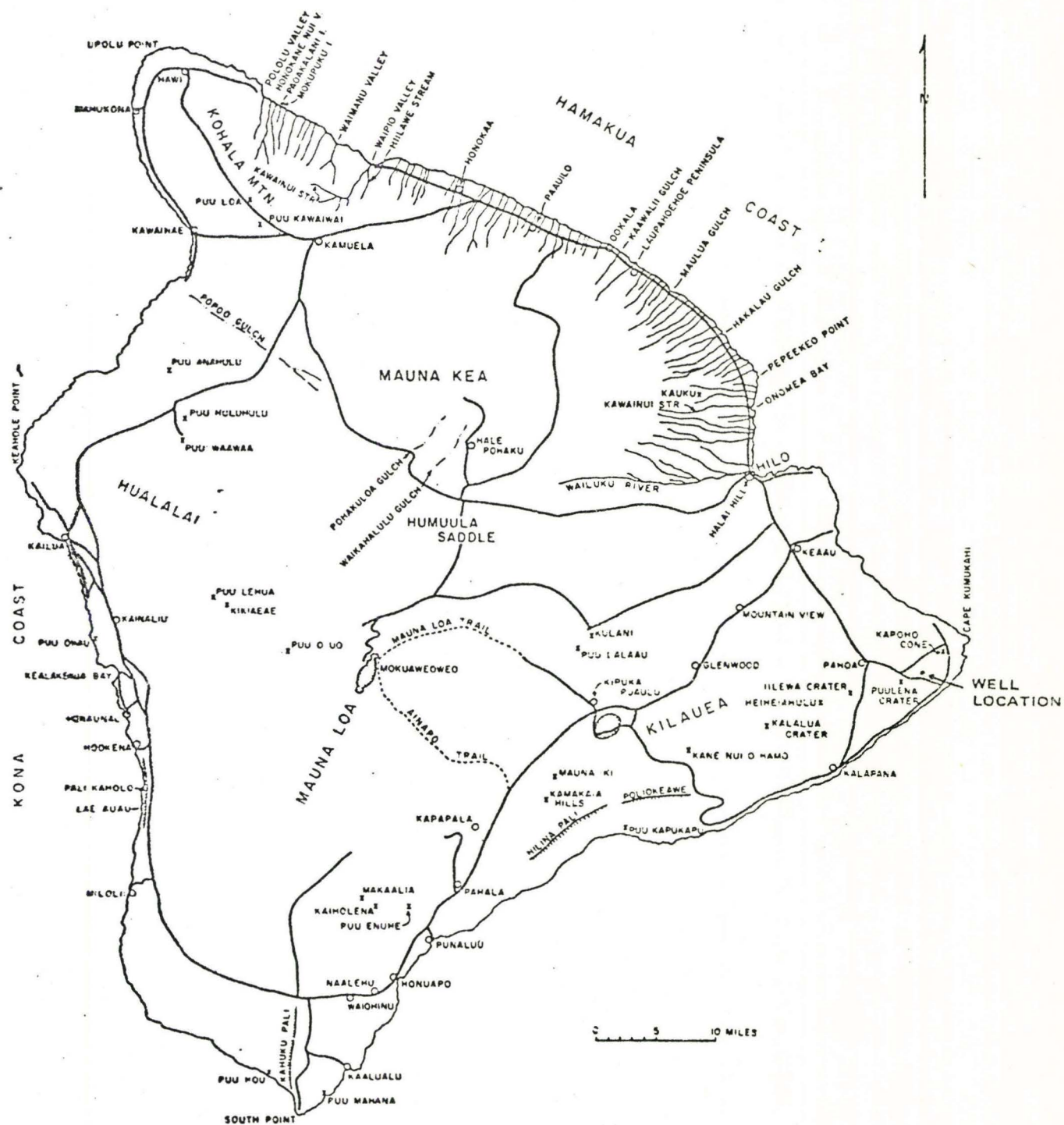
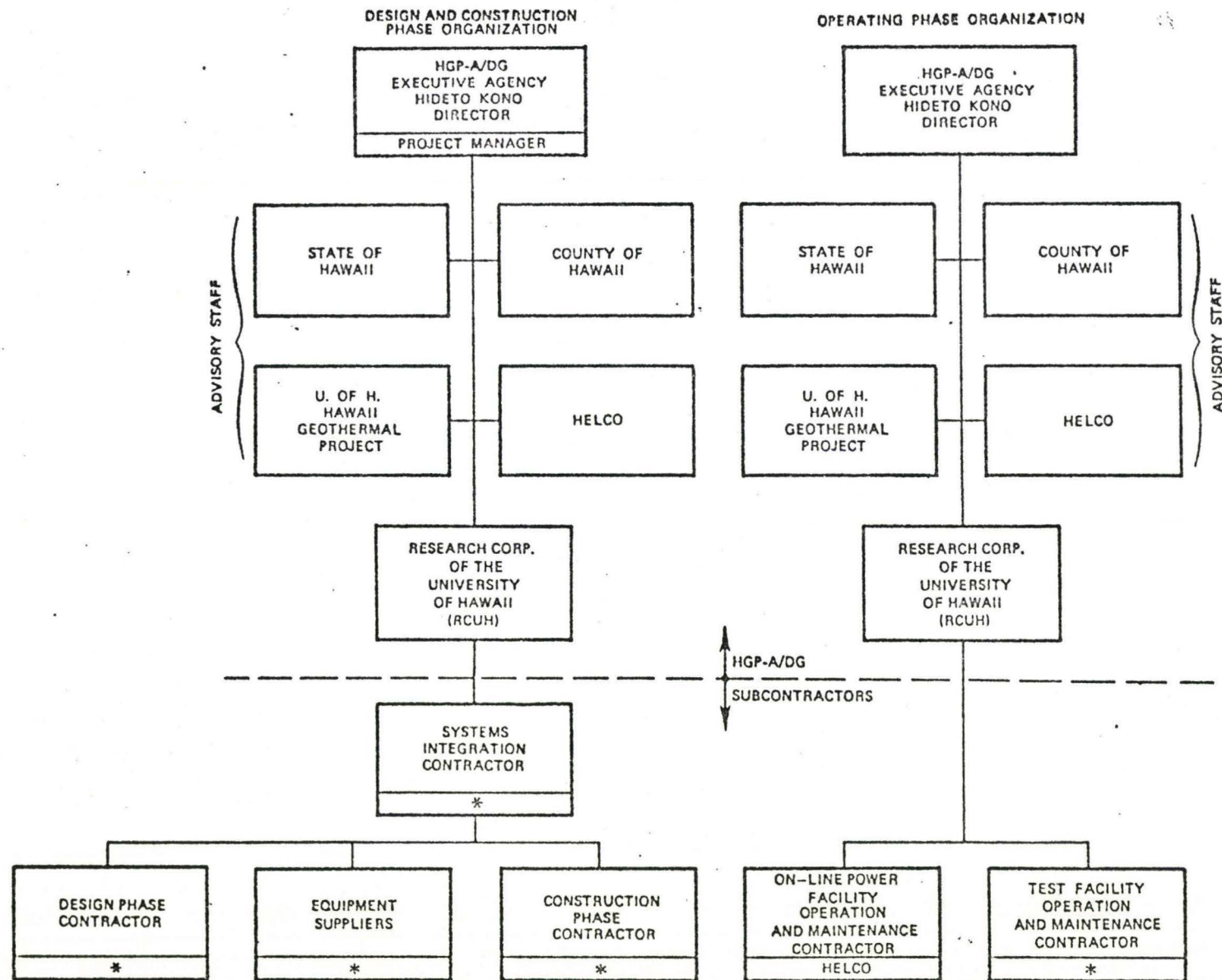


Figure 2-1. Island of Hawaii



* TO BE SELECTED AT AN APPROPRIATE DATE.

Figure 2-4. The HGP-A Development Group (HGP-A/DG)

The national state and county interests are served by ERDA's dissemination of data developed in (1) the operation and maintenance of a geothermal power plant which is permanently connected into a utility company power grid, (2) the impact on the environment due to long term production from a two phase hydrothermal resource, (3) demonstration testing of new electrical and non-electrical innovations for utilizing geothermal energy, and (4) the geophysics and reservoir engineering necessary to assess the economics of a young volcanic resource.

Some factors that must be considered to be of major value to the geothermal community and will be largely satisfied by the proposed research station are:

- Early demonstration of electrical energy produced from a hydrothermal resource
- The use of well head generation schemes to produce early cash flow for commercial developers
- Reduction of initial capital investment by developers (reduction in financial risks)
- Demonstration that development of small anomalies may be economically attractive
- Portability or transportability of conversion plants to test new prospective areas
- Provide two phase fluid (steam and/or water) for testing components and subsystems.

The University of Hawaii's specific interests are related to research and teaching in geophysics, geology, and engineering, chemistry, economics, socio-economics, and business; and as related to its services to the State of Hawaii, as exemplified by its role in HGP, in the identification and investigation of geothermal resources throughout the island chain.

HGP-A/DG will achieve the objectives of this proposal by obtaining the services of an integrating contractor who will perform the architect and engineering (A&E) function in designing the facility and will assist RCUH in implementing the design by performing as a construction manager. A "Utilization Plan" will be developed during the design phase for subsequent scheduling of specific test activities at the research stations.

3. TECHNICAL APPROACH

SYSTEMS AND FACILITY CONCEPT

The geothermal operational elements are: (1) a geothermal resource; (2) an on-line power plant utilizing the resource; (3) a research facility to test developed concepts; (4) support facilities; (5) personnel; and (6) the environment. A breakdown of these elements into major subcategories is:

- (1) Geothermal Resource
 - (a) The Pahoa Geothermal Anomaly
 - (b) The HGP-A Well (4MWe)
 - (c) A Fluid Reinjection System
- (2) On-line Power Plant
 - (a) Turbogenerator Set
 - (b) H₂S Abatement System
 - (c) Steam/Water Separator & Demister
 - (d) Barometric Condenser and Eductors
 - (e) Substation
 - (f) Cooling Towers
 - (g) Electrical Load Banks
 - (h) Acoustic Controls
 - (i) Instrumentation and Controls
- (3) Research Facility
 - (a) Test Pad for Experimental Electric Conversion Systems
 - (b) Two Test Pads for Concept and Component Testing

- (4) Support Facilities (Office, Maintenance, Laboratory and Parking Facilities)
- (5) Personnel (Operating, Maintenance, Research)
- (6) The Environment (H_2S , Hg, Sludge Removal, Noise).

The total research station consists of an integrated arrangement of all of these elements to serve the purposes of the sponsor group, including ERDA, in promoting the technology and operating experience necessary for utilization of the nation's geothermal resources. The text which follows show how the project will be managed to minimize costs and schedule time to complete. Figure 3-1 shows a twelve-month "design phase" and an overlapping 22 month "construction phase" with a total schedule time of 24 months. An overlap is required to accommodate because of long lead time items, with the turbogenerator being the pacing item. The first month of the design phase will be devoted to tradeoff studies, for selection of the long lead time items and development of bidding specifications.

PROJECT TASK FLOW CHART AND SCHEDULE .

A Project Task Flow Chart, Figure 3-2, graphically presents the interactions of specific work items which constitute the entire project. Each task unit contains the start of a subsequent task and requires the completion of a preceding task. While the project is separated into two overlapping phases, development and implementation, it can best be managed by control of five major functions:

- Project Administration and Support
- Systems Requirements Definitions
- Systems Design and Integration
- System Implementation
- Operation and Training.

The project "go ahead" will start five concurrent task activities; a site survey (preparatory to performing design); review of reservoir data; development and requirements; review of geothermal research projects that may use the test facility; and research and test facility requirements.

A concept design review will be held at the completion of the Requirements Definition Function to obtain the concurrence of ERDA for the long lead equipment and total system concept. This milestone will be the starting point for the preparation of detailed specifications, preparing construction drawings, obtaining competitive subcontractor bids, and awarding contracts. A preliminary design review will be held when the design is approximately 60 percent complete. Long lead equipment interface information will be integrated into the final design.

The completion of the final design review, with approval and concurrence by ERDA, will initiate the construction and subcontractor selection phase as well as submission of the implementation proposal to ERDA. Equipment bids and selection cycle and drilling of the injection well will begin at this time. The purpose of drilling the reinjection well prior to construction is to be able to fill the reserve pit as soon as possible. The pit now occupies an area set aside for the research facility. Installing

equipment, erecting buildings, installing piping, structures and electrical and instrumentation systems will all be performed concurrently. The complete construction, installation, checkout and startup operation will be charted in a Critical Path Method type flow in more detail in order to establish the critical flow path and to guarantee the orderly implementation of the complete research facility.

The joint occupancy date (JOD) indicates when the operators of the installation will become residents and commence their training. The beneficial occupancy date (BOD) is the estimated time that the system will go "on-line" and satisfy power delivery requirements.

3.1 GENERAL PROJECT REQUIREMENTS

This section is concerned with general requirements and interactions which must be satisfied in the design of a typical research station.

The requirements are grouped into surface characteristics of the site which determine the relative placement of equipment on the site; reservoir and fluid characteristics, which will define the steam and water effluent conditions used to design the on-line power plant and the research and test facility (pads); the power conversion system requirements, which dictate the size and relative placement of system components; support facility requirements, which are required to make the system operational; operational training requirements; and environmental factors and plant siting permits.

Surface characteristic definition is of value to the layout of the station. Access will be from the adjacent highway and will permit moving hardware to the test pads. Further, ambient wind conditions suggest placement of the cooling towers such that the water vapor is emitted from the downwind side of the facility.

It is expected, on the basis of experience at other geothermal power installations, that downhole operations may occasionally be required. Therefore, the wellhead fittings and instrumentation should be readily removable and the area immediately surrounding the well should permit operation of a work-over rig.

Reservoir fluid characteristics enter into the design of almost all elements of the research station. Wellhead pressure characteristics determine the optimum pressure for design of the turbine and chemical characteristics will determine the selection of the types of materials to be used in components which contact the geothermal fluid.

The HGP-A well exhibits a peak power output of 4.0 MWe with a three inch choke. The corresponding steam flow is 62,000 lbs/hr at 180 psia and 373°F. Utilizing this flow to drive a condensing turbogenerator will provide a net power output from the power station of 3 MWe. However, the local power transmission grid cannot accept more than 2 MWe without modification. Accordingly, a resistive load may be required to accept

the excess of 1.0 MWe when the turbine is run at capacity. However, a 1.0 MWe load bank may be required for another reason as well. The electrical test pad in the research facility, for testing experimental geothermal to electric power conversion devices, will require a load. An examination of ERDA's R&D projects for the development of new geothermal power conversion systems (see Utilization Plan, Section 3.2.5.1) reveals that a 1.0 MWe load bank will accommodate all of ERDA's ongoing ERDA projects.

There are three reasons for providing an independent variable load:

1. The manipulation of the load of the on-line power plant to accommodate a varying and possibly erratic test engine output is a threat to maintenance of voltage and frequency standards required by utility customers.
2. The technical crew running the experimental power plant tests will have enough problems of their own without being slowed down by procedures necessary to meet public utility transmission system requirements.
3. The central purpose of the on-line turbogenerator test program is the development of operation and maintenance data for future commercial wellhead operations. This purpose is clearly compromised by altering the on-line load to accommodate the load requirements of the experimental power plant.

If geothermal well fluids are to be available to accommodate ERDA research projects, the on-line turbinegenerator cannot use the full well output. The 1.0 MWe load requirement for an experimental power plant test can be translated into a 1.0 MWe demand on the well. Also this demand is not inconsistent with non-electric test needs of ERDA. It is clear, therefore, that a "normal" on-line test power plant demand on the well of 3.0 MWe can be accommodated while a 1.0 MWe well demand is used for research test purposes. This division of the well resource has been the guide for all subsequent analysis in this proposal. However, all data and information used are intended for a typical design only and are subject to change based on actual design and equipment selection.

A general requirement on the turbinegenerator set design is that it represent a candidate design for ERDA's wellhead generator project, i.e., a conversion system that may be used throughout the geothermal industry. A variable area inlet nozzle bank may be desirable to meet this requirement since it affords an improved[†] efficiency at the low end of a variable inlet pressure range. The variable nozzle area feature is intended to accommodate not only pressure variations in a given well, but also to permit the design of a standardized wellhead turbinegenerator that is adaptable to a range of wellhead conditions that will be found in different regions of the western United States.

As* will be shown later, the current well test data indicates a barometric condenser operating at 3" Hg represents a near optimum situation. There are many geothermal fields where temperature and pressures similar to the HGP-A well are expected, so standardization on these conditions is reasonable.

The typical HGP-A demonstration system used in this proposal is envisioned to be a single flash system. However, final selection will be made only after requirements have been determined and thoroughly discussed with ERDA.

The cooling towers should be designed to handle the cooling load represented by the heat of vaporization of the entire steam output of the well. Except for the small portion actually converted into mechanical or electrical work, as limited by the Carnot efficiency, this heat will be rejected to the atmosphere.

During the well testing phase of the Hawaii Geothermal Project two environmental problems were quickly pointed out by residents living downwind of the well. One was the odor of H_2S ; and the other detectable noise. As a matter of policy the project will not subject the local population to

[†]Improved over a fixed inlet nozzle area design

these nuisances even though they may be below legal levels. Accordingly, an H_2S abatement subsystem will be incorporated into the facility, and silencers will be employed.

Other environmental problems may be encountered as a result of station operation. The discharge from an iron catalyst H_2S control system may be an example. Water separated from the well fluid flow is another. The former will be handled by obtaining approval for dumping, if the iron catalyst system is selected. The latter will require a reinjection well that will not pollute ground water supplies or damage the geothermal reservoir.

The research facility concept has test pads for non-electric equipments using geothermal water and/or steam for experiment and testing purposes. The utilization plan (Section 3.2.5.1) identifies some of the ERDA projects which may be accommodated. The facility will provide the means for varying the temperature and quality of the fluids from all water to all steam.

A data acquisition system will be provided to record the on-line power plant data by the utility operators. In addition "provisions only" will be offered for experiments at the test pads. Space will be provided in a laboratory building for a data acquisition system that may be desired in the future by experimenters.

A security system is suggested to permit monitoring the premises at night. The present concept is a simple burglar alarm system that would alert both a monitoring station in Hilo and the nearest police station. If the security is breached the Hilo operator(s) have been provided a means to initiate automatic facility shutdown.

All selected equipment suppliers will be required to provide descriptive and/or operating and maintenance manuals. Also, the integration contractor (IC) will be required to provide manuals for operation and maintenance of the entire facility. Training will be provided for permanent facility operating staff. It is expected that subcontractors (such as the turbo-generator supplier) will supply support personnel during this phase of the activity.

3.1.1 Surface Characteristics

The wellsite is located on a lava flow that occurred in 1955. The terrain slopes gently to the south and the crater from which the 1955 flow originated lies approximately three-quarters of a mile to the southwest.

The wellsite is graded into two areas, separated in elevation by approximately ten feet. The undisturbed surface is lichen-covered lava of the aa type. Vegetation is sparse and wildlife is not plentiful.

Access to the wellsite is excellent. A paved, all-weather highway (Highway 132), forms one boundary of the wellsite.

3.1.2 Reservoir Characteristics

The generalized profile of the HGP-A well, together with temperature profiles recently measured in the well, are depicted in Figure 3-3. The major producing zone is thought to lie between the depths of 3500 to 4500 feet with a lesser producing zone below 6000 feet. Slotted liner is installed from a depth of 2216 feet to total depth (6435 feet). The well has surface casing above 2216 feet.

A bottom-hole temperature of about 600°F is indicated, and a produced fluid temperature of about 575°F is expected. Temperature profiles obtained in November, December, and January are very similar; however, previous profiles obtained during July, August, and September show a producing zone temperature of approximately 654°F. The reason for this difference is not known.

The reservoir is comprised of highly altered, extensively fractured basalts with many of the fractures filled with secondary minerals. The basalts are vesicular with an average porosity of ten percent. Primary permeability is almost non-existent. Preliminary test data indicate the transmissivity of the reservoir is 1000 millidarcy-feet. Accordingly, for an assumed producing zone thickness of 1000 feet, the average permeability is one millidarcy.

The reservoir, as outlined by microearthquake data, occupies an area of 4.5 square kilometers and a volume of 9.5 cubic kilometers. Considering the porosity to be 10 percent, one cubic kilometer of fluid occupies the reservoir. All data indicate that the life of a single well drawing upon such a reservoir is for all practical purposes limitless.

3.1.3 Fluid Characteristics

The reservoir fluid is much less saline than sea water, having a total dissolved salt content at about 2300 milligram/liter. The fluid is rich in silica, probably from high-temperature reaction with the host rock. Chlorine content is low. The fluid has a pH of approximately two.

3.2 DETAILED PROJECTS REQUIREMENTS AND ANALYSIS

The text which follows develops a preliminary version of the detailed project requirements supported by the analyses which were used to develop the requirements. During the contract effort these data will be used as a baseline for (1) the development of requirements leading to the tradeoff studies and final selection of equipment, (2) the preparation of environmental supporting text for environmental studies and (3) plant siting and drilling permits to be obtained by the State of Hawaii. An operational training program will also be developed by the operational contractor.

3.2.1 Surface Characteristics.

3.2.1.1 Terrain (Topography) Characteristics

The HGP-A wellsite is located approximately 2.75 miles north of the ocean at an elevation of approximately 575 feet. The wellsite lies on the crest of an easterly plunging ridge that dominates the regional topography of the area; the coast line wrapping around Cape Kamuhahi reflects this regional feature.

The terrain at the wellsite slopes gently to the south. A small crater, Puu Honuaula, exhibiting approximately 100 feet of relief, lies approximately three-quarters of a mile to the north and a chain of three small craters, dominated by the central Puulena Crater, lies approximately three-quarters of a mile to the southwest. Puuelena Crater, similar in size to Puu Honuaula, was the source of the 1955 lava flow.

The wellsite has been graded into two areas separated by an embankment. Each area contains approximately two acres. The well and wellhead equipment are located in the lower area; the higher area contains a plastic-lined water pond.

3.2.1.2 Soil and Rock Types

The wellsite is located on a lava flow that occurred in 1955. The undisturbed surface is a basalt of the aa type. Weathered surfaces are red-brown.

The general area is covered by recent flows and a thin soil, derived from decomposed basalt, exists in the vegetated areas near the wellsite.

3.2.1.3 Plants, Vegetation and Animals

The aa lava upon which the well site is located is covered by a dense growth of lichens in its undisturbed state. Ferns and saplings also are in the immediate area. Forested areas consisting mainly of ohia lehua trees (the most common tree in Hawaii). Tree ferns and various ground-covers are found less than a mile from the site. Vegetation in the area is common to that found elsewhere in Hawaii in the vicinity of recent lava flows.

A sugar plantation is located approximately three miles to the west and a large papaya growing area is about one to two miles to the east.

The area does not contain many fauna. Rats are found in the sugar and papaya cultivation areas and the mongoose is common. Deer and goats are found on the slopes of the distant mountains. Birdlife is also not plentiful in the area; only seven species were observed during a two-day survey, Reference 3-1.

3.2.1.4 Site Access

Access to the wellsite is excellent. Highway 132, connecting Pahoa and Pohoiki on the coast, forms one boundary of the wellsite and is approximately 300 feet from the wellhead. This is a two-lane, paved, all-weather highway that connects to Highway 13 at Pahoa, affording access to Hilo and the entire Big Island. Shoulders on Highway 132 are narrow but the drilling rig, supplies and support equipment used in drilling HGP-A were transported over this road with no difficulty.

3.2.1.5 Electric Distribution System

A 34.5 Kv overhead transmission line with a power handling capability of approximately 2 MWe exists in the vicinity of the project site. This line will be extended to the project by HELCO, and terminated in a dead

end structure. Interface definitions and provisions are required. The following will be accomplished:

- Determine the most cost effective location of the dead end structure so that adequate slack loop ground clearance is maintained.
- Determine the need for an overhead protective - static line and provide if required.
- Determine the grounding interface requirement for the transmission line and its protective equipment. Provide an extension of the substation grounding grid to meet this and the substation voltage gradient control requirements.
- Determine the termination hardware and conductor requirements (associated with the substation to transmission slack span or loop) and provide them.

3.2.1.6 Ambient Conditions (Weather)

On the Island of Hawaii, average annual precipitation varies from 16 inches on the eastern side of the Island to 300 inches just north of the Puna District. For all the islands of Hawaii, mean monthly precipitation varies from a low of about one inch from May to September to a high of 3-5 inches from December to February. The least rainfall occurs during June to September, while the most occurs during November to February.

Mean monthly temperatures for all islands varies from 70°F during the winter to nearly 80°F in the summer. Minimum and maximum temperatures rarely fall below 60-65°F or above 85°F. Prevailing winds (up to 10 m.p.h.) generally come from the east.

3.2.1.7 Lava Flows and Earthquakes

There is a possibility of lava flows, ash or cinder falls, and earthquakes affecting the wellsite in the next 30 years.

The Puna region is traversed by the East Rift of Kilauea Volcano and this rift is marked by magmatic eruptions and steam vents.

Lava flows, originating from eruptions along this rift, occurred in the Puna Region in 1955 and 1960. (The wellsite is located on the edge of the 1955 flow). A large amount of cinder fell over several square miles during the 1960 eruptions. Flows also occurred in the region in the

mid-eighteenth and mid-nineteenth centuries. Eruptions along the East Rift, but approximately 30 miles west of the wellsite, have happened as late as 1974.

The 1955 eruption was accompanied by quakes and many small quakes have accompanied the later eruptions. A seismograph station at Pahoa recorded many quake swarms, with the largest events having a magnitude of two, between 1964 and 1969. A microquake survey conducted over the geothermal area for approximately three weeks in 1974 recorded many microquakes and four larger events.

3.2.2 Reservoir Characteristics

3.2.2.1 Type of Reservoir System

The HGP-A well is located on a hydrothermal reservoir in a geologically young volcanic region. The reservoir falls into the category of Volcanic Resource (hydrothermal) as defined by ERDA, Reference 3-2. The USGS classifies this reservoir among the identified hot-water convection systems with indicated subsurface temperatures from 90° to 150°C, Reference 3-3. The specific area is identified as the 1955 eruption area, East Rift, on page 34 of Reference 3-3, where a subsurface area of two square kilometers, a subsurface volume of four cubic kilometers, and heat content of 0.3×10^{18} calories are assigned to the reservoir.

3.2.2.2 Geological and Structural Environment

The HGP-A well and geothermal reservoir are located in one of the most active volcanic areas of the world. The two near-by volcanoes, Mauna Loa and Kilauea, have been active throughout historic time and the geologic section penetrated by the well appears to be composed entirely of igneous material from Kilauea with some secondary mineral deposition.

The well and geothermal reservoir are located in the East Rift zone of Kilauea. This rift is a major structural fracture zone that extends eastward from the caldera to the sea coast at Cape Kumakahi. The surface trace of the rift is marked by cinder cones, small craters, and fissures (figure 3-7a). The area abounds in essentially vertical dikes that resulted from fissures filling subsequently to opening. The East Rift is the site of very recent volcanism with lava flows occurring as late as 1974.

3-27

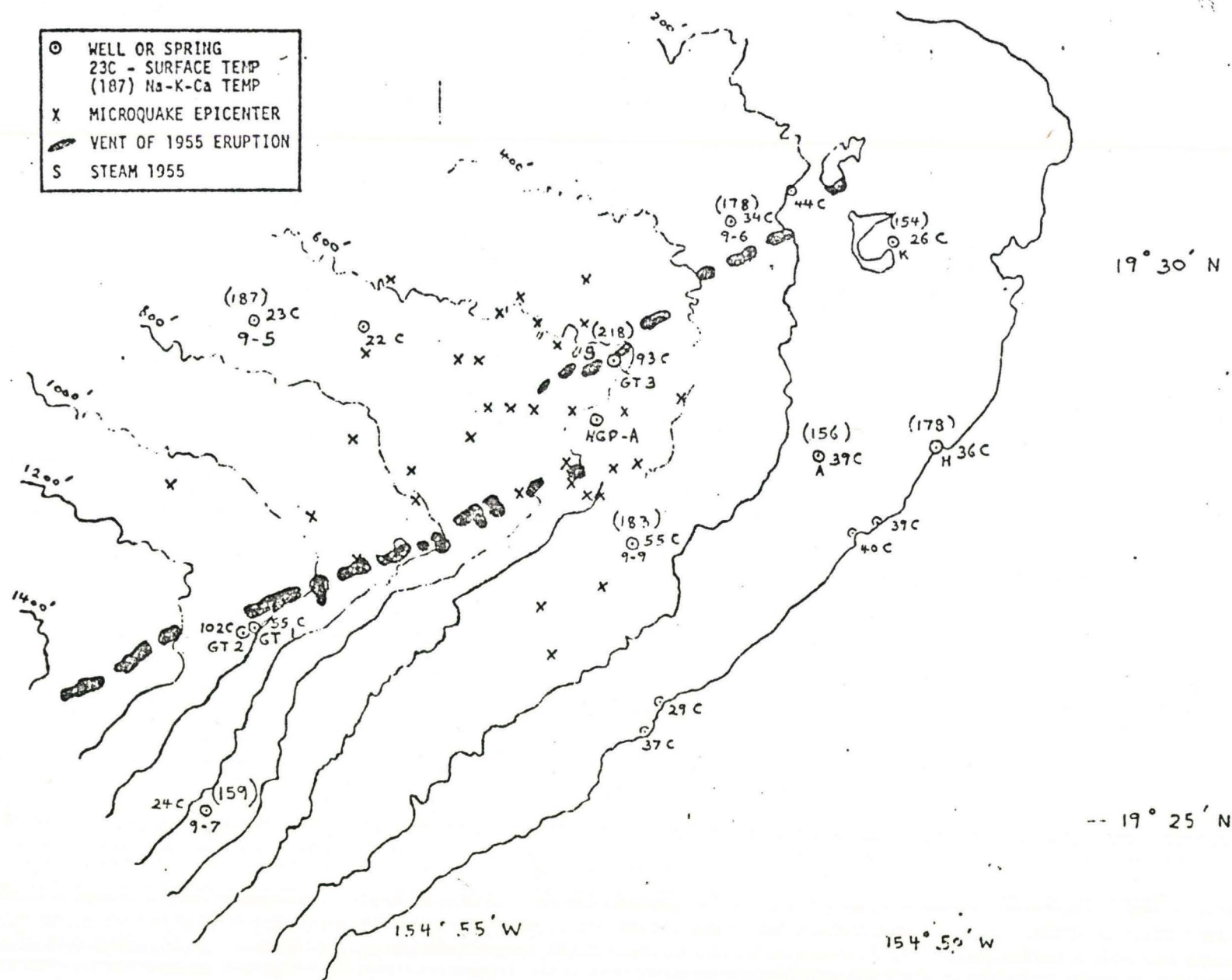


Figure 3-7a. East Puna Map

RECEIPT

Date Dec. 29 1977 2670

Received From Dept. of Planning & Economic Dev.

Address Rm 2359 Honolulu, HI

One Hundred and no/100 Dollars \$ 100.00

For Special Permit appln.

TRIC 1-4-01: por. 2

ACCOUNT			HOW PAID		
AMT. OF ACCOUNT			CASH		
AMT. PAID			CHECK	100.00	
BALANCE DUE			MONEY ORDER		

By Mutsu M. Kawasaki

BK503 Rediform

REQUISIT

A

OP

CODE

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

STATE OF HAWAII REQUISITION & PURCHASE ORDER

DEPARTMENT OF PLANNING &
ECONOMIC DEVELOPMENT

CSPTA

ORGANIZATION
P.O. Box 2359, Honolulu, Hawaii

FUNCTION AND ACTIVITY
96804

DELIVERY ADDRESS

Director, County of Hawaii Planning Dept.

25 Aupuni Street

Hilo, Hawaii 96720

INSTRUCTIONS TO VENDORS

include delivery charges unless otherwise stated.
Purchase Order Number, Date, Appropriation
Symbol, and DISCOUNTS allowed on all invoices. The
State reserves the right to reject any items supplied that
are not in accordance with specifications even though
payment has been made in order to obtain discounts.
This is not a PURCHASE ORDER unless assigned a P.
O. Number and authenticated by AUTHORIZED SIGNATURE.

PURCHASE
ORDER NO.

001814

Date Dec. 6, 1977

Deliver to Organization as Shown

14-17

ON OR BEFORE

Send Four (4) Copies of Invoice to:

QUAN.	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
		Filing Fee for Special Use Permit for Hawaii Geothermal Research Station.		<u>\$100.00</u>

(4)
Invoice mailed 12/9/77



NORRIS Thompson
REQUISITIONER TELEPHONE

VOUCHER
NUMBER

AUTHENTICATED BY:

[Signature]
AUTHORIZED SIGNATURE

GOODS/SERVICES RECEIVED BY

DATE

A		OP CODE	VENDOR NO	DELIVERY DATE	MO	DAY	YR	RELIEF CODE	NO OF INVOICES	IF ONLY ONE INVOICE COMPLETE B BELOW		IF MORE THAN ONE INVOICE COMPLETE INVOICE LIST	
18		19-20	21-30	31-32	33-34	35-36	37	38					
B		INV NO	INV DATE	MO	DAY	YR	AMOUNT	REMITTANCE DATA					
18		19	31				37	48					
UNIFORM ACCOUNTING CODE													
KP	TR	F	YR	APP	D	S-D	OBJECT	FUNCTION	L	PROJ	ESTIMATED COST	ACTUAL COST	LIQ
C	22	G	78	119	B	003					\$100.00		
D													
E													

COPY #1 - VENDOR

EXHIBIT A-10

STATE ACCOUNTING FORM C-03
JULY 1, 1974 (REVISED)

PLANNING DEPARTMENT
County of Hawaii
Hilo, Hawaii

TO: DEPT. OF PLANNING & ECONOMIC DEVELOPMENT
C S P T A
P. O. BOX 2359
HONOLULU, HAWAII 96804

DATE: December 9, 1977

PURCHASE ORDER NO. 001814

Filing Fee for Special Use Permit for
Hawaii Geothermal Research Station

100.00

EXHIBIT A-10

December 2, 1977

Mr. Hideto Kono, Director
Department of Planning and Economic Development
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Kono:

Special Permit - Geothermal Research Facility
TMK: 1-4-01:portion of 2

This is to acknowledge receipt on November 25, 1977, of the above described special permit application. Your application is now being processed by this office. Please be informed, however, that no action will be taken on it until the required environmental impact statement has been approved.

The County Planning Commission shall conduct a public hearing on the request within a period of not less than thirty (30) nor more than one hundred twenty (120) days from the receipt of the application. The Planning Commission shall then act on the application not earlier than fifteen (15) days after the public hearing but within a reasonable time thereafter. Should the Planning Commission recommend favorably on the request, it will then be forwarded to the State Land Use Commission for final action.

However, the Planning Commission may deny the request if it is found that the proposed use does not meet the special permit guidelines. In this case, their decision is final. In accordance with the provisions of Chapter 205-6, Hawaii Revised Statutes, a denial by the Planning Commission may be appealable to the Circuit Court of the circuit in which the land is situated, in this case, the Third Circuit Court.

Notice of the time and place of the public hearing shall be forwarded when the application is scheduled for Commission action.

Should any questions arise, please contact Ilima Piianaia of this department 961-8288.

Sincerely,

Sidney M. Duke
Sidney M. Duke, Director

cc: State Land Use Commission
Mr. Kack Keppeler

EXHIBIT B

DEC 5 1977

MEMORANDUM:

PLANNING DEPARTMENT — County of Hawaii, Hilo, Hawaii 96720

To: DPW, DWS, Highways, Health, R&D,
Police, Fire, Soil Conserv.,
Dept. of Ag., Helco

Date: December 2, 1977

From: Director 

Subject: Special Permit Application
Geothermal Research Facility
TMK: 1-4-01:portion of 2

The attached application for a special permit is forwarded for your review. May we have written comments within two weeks. Thank you.

mmk
Enclosure

EXHIBIT C

DEC 8 1977



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1820

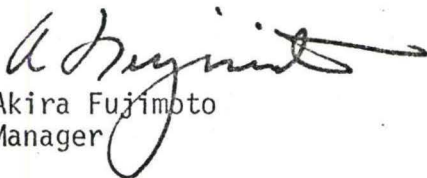
HILO, HAWAII 96720

25 AUPUNI STREET

December 7, 1977

TO: Planning Department
FROM: Manager
SUBJECT: SPECIAL PERMIT APPLICATION
APPLICANT - DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
TAX MAP KEY 1-4-01:2 (PORTION)

We have no adverse comments or objections to the subject request.


Akira Fujimoto
Manager

QA

... Water brings progress...

EXHIBIT D

STATUS OF PERMITS AND LEGAL AGREEMENTS

1. EIS - State

- a. Status: DPED will file with Environmental Quality Commission (EQC) on December 20 for publication in December 23 EQC bulletin. February 27 is earliest feasible acceptance date.
- b. Deadline: County of Hawaii Planning Commission will not schedule a public hearing on the Special Use Permit until the EIS is accepted.

2. Special Use Permit Application (SUP)

- a. Status: DPED filed the SUP with the County of Hawaii Department of Planning on November 25, 1977. The County Planning Commission has until March 25, 1978, to hold a public hearing on the SUP. If the EIS is accepted around February 27, the end of March would be the earliest the Special Use Permit could be accepted by the County Planning Commission. *Time & subject could be approved by the LUC.*
- b. Deadline: ASAP to permit well-testing, however, construction of the facility is not scheduled to begin before March 1, 1979.

3. Agreement with Landowner

- a. Status: An agreement on the method of land transfer to the State will be reached by the end of December.
- b. Deadline: This matter should be resolved ASAP, but an agreement must be signed before March 1, 1978, the target date for finalizing a contract between RCUH and DOE.

4. Geothermal Mining Lease

- a. Status: The procedure for obtaining a geothermal mining lease will be followed: 1) when the procedure is established by the adoption of the Rules and Regulations (January 27 at the earliest), and 2) when the State has acquired the land from Kapoho.

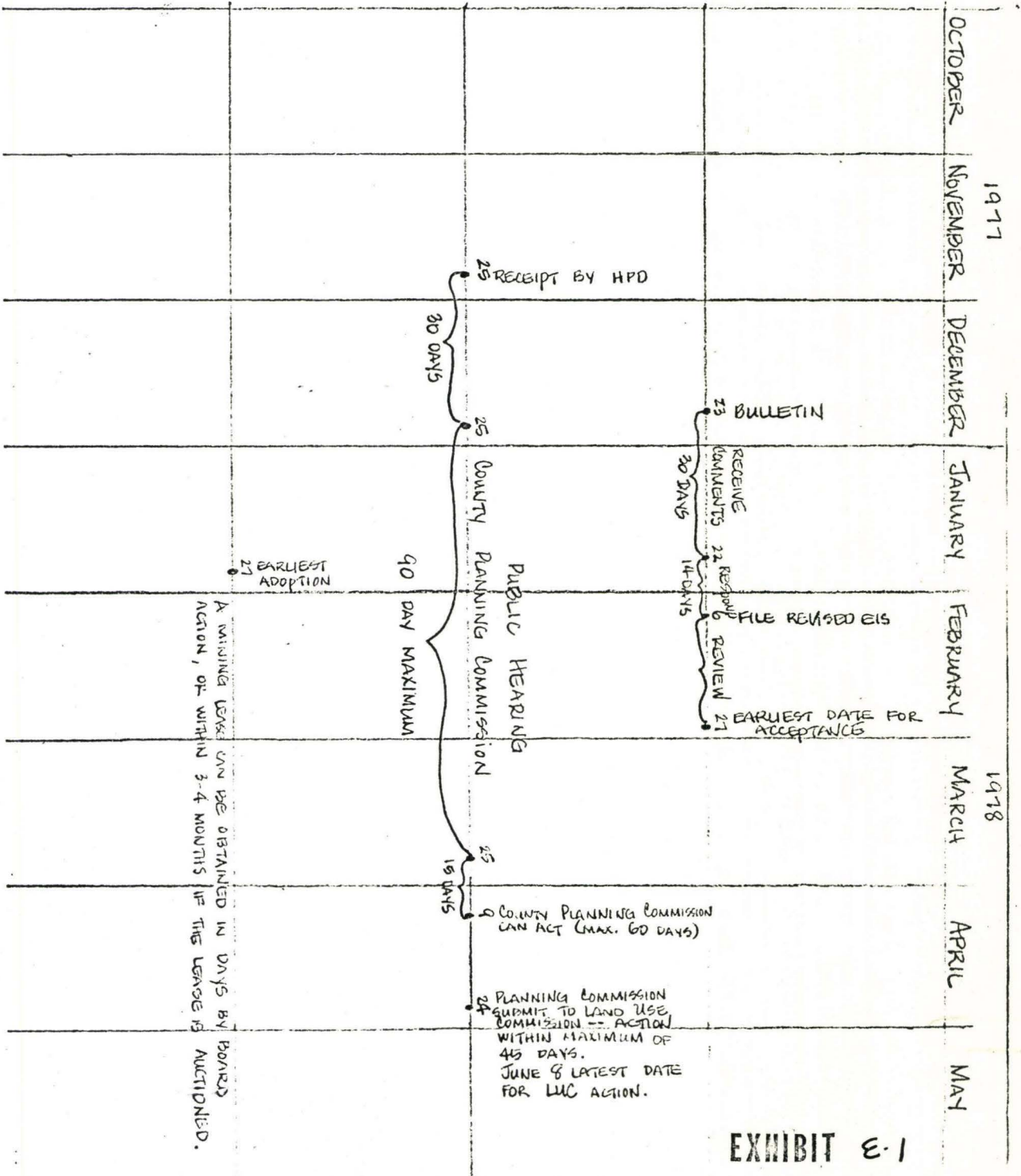
The procedure for obtaining a mining lease if the surface land is privately owned (with a mineral reservation to the State) can be different than if the land is State-owned.

- b. Deadline: ASAP, although utilization of the geothermal resource is not anticipated until March 1, 1980.

ENVIRONMENTAL IMPACT STATEMENT

SPECIAL USE PERMIT

RULES AND REGS





POLICE DEPARTMENT

COUNTY OF HAWAII
349 KAPIOLANI STREET
HILO, HAWAII 96720



OUR REFERENCE

GUY A. PAUL

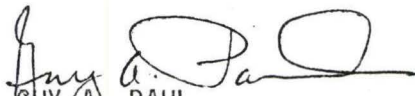
YOUR REFERENCE

CHIEF OF POLICE

December 12, 1977

TO : SIDNEY FUKU, PLANNING DIRECTOR
FROM : GUY A. PAUL, CHIEF OF POLICE
SUBJECT: SPECIAL PERMIT APPLICATION - GEOTHERMAL RESEARCH FACILITY
TMK: 1-4-01:portion of 2

The special permit application submitted by the Geothermal Research Facility has been reviewed and from the police standpoint, we can foresee no adverse effects from the requested land use.


GUY A. PAUL
CHIEF OF POLICE

TH/RLP/k

EXHIBIT F

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HAWAII DISTRICT
50 MAKALA STREET
P. O. BOX 4277
HILO, HAWAII 96720

IN REPLY REFER TO:

HWY-H
77-2.1248

December 12, 1977

MEMORANDUM:

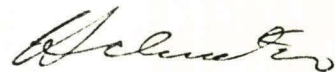
TO: Director, Planning Department
County of Hawaii

FROM: District Engineer, Hawaii

SUBJECT: () Change of Zone Application
() Variance Application
() Subdivision Application No.
(x) Special Permit Application
Geothermal Research Facility
TMK 1-4-01:por 2

We have no objections on the proposed action for the subject application.
Our comments on the draft E.I.S. are:

1. Revise Highway 13 to Highway 130 (pg. 27).
2. Highway 132 is the Pahoa-Kapoho Road and not the Pahoa-Pohoiki Road (pg. 27 & 28).



CHAS L. SCHUSTER

EXHIBIT G

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

JOHN FARIAS, JR.
CHAIRMAN, BOARD OF AGRICULTURE

YUKIO KITAGAWA
DEPUTY TO THE CHAIRMAN

BOARD MEMBERS:

MEMBER - AT - LARGE

ERNEST F. MORGADO
MEMBER - AT - LARGE

Sidney Goo
MEMBER - AT - LARGE

SHIZUTO KADOTA
HAWAII MEMBER

STEPHEN Q. L. AU
KAUAI MEMBER

FRED M. OGASAWARA
MAUI MEMBER

December 12, 1977

MEMORANDUM

To: Mr. Sidney Fuke, Director
Hawaii County Planning Department

Subject: Special Permit Application
Geothermal Research Facility
TMK: 1-4-01: portion of 2

The Department of Agriculture supports approval of this Special Permit Application. As the exhibits to the application clearly indicate, the potential benefits of this project to agriculture greatly outweigh the potential costs which would involve the loss of small amounts of agricultural land.

We appreciate the opportunity to comment.

A handwritten signature in dark ink, appearing to read "John Farias, Jr.", is written over the typed name and title.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

EXHIBIT H

PUNA SOIL AND WATER CONSERVATION DISTRICT
P. O. Box 612
Hilo, Hawaii 96720

December 14, 1977

Mr. Sidney Fuke, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

The Puna Soil and Water Conservation District Board
has completed its review of the Special Permit application
submitted by Dept. of Planning and Economic Development for land parcel
TMK 1-4-01:portion of 2.

We have attached the resource evaluation prepared by the USDA Soil
Conservation Service containing pertinent soils information.

Other Factors Affecting Development:

Upon completion of our field investigation with SCS technicians, it
has been determined

See attached SCS report.

We hope that we have been of some assistance. Please do not hesitate
to call on us for further clarification should the need arise.

Sincerely,



Northrup H. Castle
Chairman

Attachment

EXHIBIT I

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 1361
Hilo, Hawaii 96720

December 14, 1977

Mr. Northrup H. Castle
Chairman, Puna SWCD
P. O. Box 127
Volcano, Hawaii 96785

Dear Mr. Castle:

As per Puna Soil and Water Conservation District's request, our staff has completed the resource evaluation concerning TMK 1-4-01:portion of 2 (Geothermal) presently under consideration for development. For your convenience, the report is composed of two sections: Soil-Related Information and Other Factors Affecting Development.

Soil-Related Information

rLV Aa lava flows.

This lava has practically no soil covering and is typically bare of vegetation except for mosses, lichens, ferns and a few small ohia trees.

Aa lava is rough and broken. It is made of clinkery, hard, glassy, sharp pieces piled in tumbled heaps.

rLW Pahoe-hoe lava flows.

Pahoe-hoe lava has a billowy, glassy surface that is relatively smooth. In some areas, however, the surface is rough and broken, and there are pressure domes.

Pahoe-hoe lava has no soil covering and is bare of vegetation except for mosses and lichens.

Other Factors Affecting Development

None

We hope that we have been of some assistance on this matter. Please do not hesitate to call on us for further technical assistance should the need arise.

Sincerely,

Roy Cammack

Roy Cammack
District Conservationist

EXHIBIT I-1

TK: 1-4-01: por 2



EXHIBIT I-2

DEPARTMENT OF PUBLIC WORKS

COUNTY OF HAWAII

HILO, HAWAII

DATE December 14, 1977

Memorandum

TO : Planning Department

FROM : Chief Engineer

SUBJECT: Application for Special Permit
Applicant: Geothermal Research Facility
Location: Kapoho, Puna, HI
TKK: 1-4-01 por. of 2

We have reviewed the subject application and we have no comments to offer.

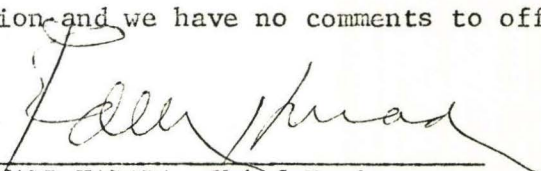

EDWARD HARADA, Chief Engineer

EXHIBIT J

MEMORANDUM:

PLANNING DEPARTMENT — County of Hawaii, Hilo, Hawaii 96720

To: DPW, DWS, Highways, Health, R&D,
Police, Fire, Soil Conserv.,
Dept. of Ag., Helco

Date: December 2, 1977

From: Director 
Subject: Special Permit Application
Geothermal Research Facility
TMK: 1-4-01:portion of 2

The attached application for a special permit is forwarded for your review. May we have written comments within two weeks. Thank you.

mmk
Enclosure

Department of Health
Hilo, Hawaii
December 19, 1977

COMMENTS

Our comments are made in a supportive manner. Background data reports odor (H_2S) and noise complaints made by Leilani and Nanawale Estate residents. Air droplets contaminating their rain catchment drinking waters were suspected by the residents and our studies found no concerns. The current submittals project for noise silences and the scrubbing of the H_2S odor. Recommend the nearby residents be informed through public meetings of your future plans and precautions.

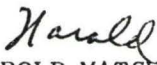

HAROLD MATSUURA
Chief Sanitarian, Hawaii

EXHIBIT K

HAWAII FIRE DEPARTMENT • COUNTY OF HAWAII • HILO, HAWAII 96720

DATE December 19, 1977

Memorandum

TO : Planning Department

FROM : Deputy Fire Chief *hs*

SUBJECT: Special Permit Application
Dept. of Planning & Economic Development
TMK: 1-4-01:Portion of 02

There is no 24-hour fire protection service available at the site, should this application be approved to install a wellhead generator at the HGP-A test well site. The nearest fire station is located at Keaau.

rfd

EXHIBIT L



DEPARTMENT OF RESEARCH AND DEVELOPMENT

COUNTY OF HAWAII • 25 AUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE (808) 961-8366

MEMORANDUM

December 20, 1977

TO: PLANNING DEPARTMENT

FROM: RESEARCH & DEVELOPMENT *Clarence W. Garcia*

SUBJECT: SPECIAL PERMIT APPLICATION - GEOTHERMAL RESEARCH FACILITY
DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Thank you for this opportunity to review and comment on the above mentioned subject. We offer the following comments for your consideration.

- a. The test facility as proposed is to demonstrate the practical feasibility of utilizing geothermal energy for electricity generation and direct use of this resource.
- b. The County of Hawaii, through the participation of the Managing Director and the Director of the Department of Research and Development has been active in the planning of this project.
- c. This research program is part of an overall energy development (alternate energy sources) program scheduled for the Big Island in its quest to attain self-sufficiency in energy.
- d. The socio-economic impact of this study, and hopefully, its subsequent development as a viable alternate energy source, can be a boon to our economy.
- e. As noted in the environmental impact statement by Robert Kamins (September 1977), the environmental impact appears to be minimal.

EXHIBIT M

HAWAII ELECTRIC LIGHT COMPANY, INC.
P. O. BOX 1027 HILO, HAWAII-96720



December 28, 1977

County of Hawaii
Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Attention: Mr. Sidney M. Fuke
Director

Gentlemen:

SUBJECT: Special Permit Application
Geothermal Research Facility
TMK: 1-4-01:portion of 2

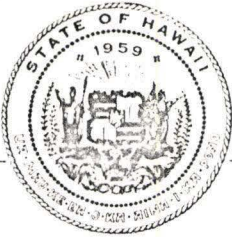
We have no comments to the above application as per
your memorandum of December 2, 1977.

Very truly yours,

Jitsuo Niwao, Manager
Engineering Department

JN: cmh

EXHIBIT N



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

December 28, 1977

Mr. Sidney Fuke
Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Special Use Permit for HGP-A Geothermal Research Facility at
Puna, Hawaii TMK: 1-4-01: 2(por.)

Dear Mr. Fuke:

Thank you for your letter of December 2, 1977 informing us that no action will be taken on our Special Use Permit application until such time as the environmental impact statement for the project has received final acceptance by the Governor.

We are presently revising the preliminary draft statement which was submitted with our Special Use Permit application, and a final draft should be ready for submission to the Environmental Quality Commission by late January, 1978. Copies of the draft EIS will be submitted to your Department for information and review at that time.

We are aware of the 120 day time limit for holding a hearing on our application, and will continue to keep you apprised as to the status of our progress in complying with the EIS procedures.

Sincerely,

A handwritten signature in dark ink, appearing to read "Hideto Kono".

HIDETO KONO
Director

EXHIBIT

0

January 18, 1978

Mr. Hideto Kono, Director
Department of Planning &
Economic Development
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
HGP-A Geothermal Research Facility
Puna, Hawaii
TMK: 1-4-01:portion of 2

This is to acknowledge your letter of December 28, 1977, concerning the status of the environmental impact statement for the proposed research facility.

The Special Permit application was received on November 25, 1977. The 120th day after receipt will fall on March 24, 1978. We appreciate being kept apprised of the EIS status. Could you please, however, let us know if your staff expects the EIS to be accepted and approved by the Governor prior to March 24. Because the Planning Commission only meets regularly once a month in East Hawaii, we must have some idea of when we can schedule the public hearing on the application. The legal requirements for notices of the public hearing and to surrounding property owners must be complied with. As a result, we shall soon be preparing the agenda for the Planning Commission's March meetings.

We look forward to hearing from you at your earliest convenience.

Sincerely,



SIDNEY FUKE
Director

IP:mmk

EXHIBIT P

JAN 19 1978

GEORGE R. ARIYOSHI
GOVERNOR



ALBERT O. Y. TOM
Chairman

TELEPHONE NO.
548-6915

STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813
January 20, 1978

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) prepared pursuant to Chapter 343, Hawaii Revised Statutes and its Rules and Regulations:

Hawaii Geothermal Research Station Utilizing
Title - the HGP-A Well at Puna, Hawaii
Location - Puna, Hawaii
Classification - Agency Action

We would appreciate your comments or acknowledgement of no comments. Please submit one copy each to:

- 1) Accepting Authority: Ofc. of Environmental Quality Control
Address: 550 Halekauwila St.
Room 301
Honolulu, Hawaii 96813
- 2) Proposing Party: Dept. of Planning and Economic Development
Address: Kamamalu Building
250 South King St.
Honolulu, Hawaii 96813

Your comments must be received or postmarked by: February 22, 1978

If you have no future use for this document, please return the EIS to the Commission. (Comments or acknowledgement of no comments should be directed to both the accepting authority and proposing party.)

Thank you for your participation and cooperation in the EIS process!

EXHIBIT Q



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

January 23, 1978

Mr. Sidney Fuke
Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Special Use Permit for HGP-A Geothermal Research Facility
at Puna, Hawaii TMK: 1-2-01:2(por.)

Dear Mr. Fuke:

This is in response to your letter of January 18, 1978, inquiring whether or not we anticipate that the EIS for the subject project will receive final acceptance by the Governor by March 24, 1978.

Based on our discussions with staff at the Environmental Quality Commission, we feel that it is highly unlikely that we will have an accepted EIS by March 24. We expect however, that we will have an accepted EIS by sometime in April, 1978.

For your information, the draft EIS was submitted to the Environmental Quality Commission on January 20, 1978. By separate cover, we are sending 12 copies of the draft EIS to your Department.

We would appreciate being notified as soon as a public hearing date has been scheduled for the application.

Thank you for your cooperation in this matter.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Hideto Kono".

HIDETO KONO
Director

EXHIBIT R

MEMORANDUM:

PLANNING DEPARTMENT — County of Hawaii, Hilo, Hawaii 96720

To: DWS, R&D, Highways, Health,
Soil Conserv. Service, Dept. of Ag,
HELCO

Date: February 3, 1978

From: Director

Subject: Special Permit Application
Dept. of Planning & Economic Dev.
HGP-A Geothermal Research Facility

Transmitted for your information is a copy of the draft EIS for the geothermal research facility at Puna, Hawaii.

Please submit any comments you may have on this to us relative to the Special Permit application by DPED, or comments you have made directly to OEQC, if you received copies of the EIS directly from DPED.

In addition, if you have no need for the EIS draft after you have completed your review, please return it to us.

Thank you.

IP:mmk

Enclosure

EXHIBIT 5

FEB 6 1978

code 77

HERBERT T. MATAYOSHI
Mayor

EDWARD K. HARADA
Chief Engineer

ARTHUR T. ISEMOTO
Deputy Chief Engineer



DEPARTMENT OF PUBLIC WORKS

COUNTY OF HAWAII - 25 AUPUNI STREET - HILO, HAWAII 96720 - TELEPHONE (808) 961-8321

January 30, 1978

Dr. Albert O. Y. Tom, Chairman
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
HAWAII GEOTHERMAL RESEARCH STATION UTILIZING THE
HGP-A-WELL AT PUNA, HAWAII

Thank you for the opportunity to review the subject E.I.S.

This department has no comments to offer except minor corrections noted in red on the paper clipped pages 8, 9, 21 and 62.

Page 8 - there are many homes in the Nanawale Estate and Hawaiian Shores and Beaches subdivisions which have County dedicated roads. Pages 9 and 21 - to the west of the well site lies Leilani Estate subdivision and the land is not in productive sugar cane.

Section 8-3, page 62 should be revised to read "Construction of the structure comprising the facility will require permit approval from the Department of Public Works, County of Hawaii".

1. Building, plumbing and electrical permits from the Bureau of Building Construction and Inspection.
2. Grading permit for site development from the Bureau of Plans and Surveys.
3. The Planning Department will also review the building plans for conformance to codes within its jurisdiction as part of the permit application review procedure.

The other comments are primarily typographical.

The marked up document is being returned attached.

Edward Harada
EDWARD HARADA, Chief Engineer

Attach.

cc: Mayor
✓ Planning Department
Research & Development Department

EXHIBIT

T

February 2, 1978

Office of Environmental
Quality Control
550 Halekauwila St., Rm. 301
Honolulu, HI 96813

ENVIRONMENTAL IMPACT STATEMENT
HAWAII GEOTHERMAL RESEARCH STATION
UTILIZING THE HGP-A WELL AT PUNA

As you had requested, we reviewed the subject Environmental Impact Statement and our comments are:

1. On page 10, first paragraph, it is stated that the water supply for Pahoa is pumped in from South Hilo. This is not true. Pahoa has its own water system which is fed from the basal aquifer; likewise, with the Kalapana and Olaa systems.
2. Will the geothermal project have any affect on the basal ground water?

Thank you for allowing us to comment on this EIS. Since we consume a sizable amount of power, we are naturally interested in any alternate energy source.

Akira Fujimoto
Manager

WHS

cc - Planning and Economic Development

EXHIBIT 4

MEMORANDUM:

PLANNING DEPARTMENT

County of Hawaii,

Hilo, Hawaii 96720

To: DWS, R&D, Highways, Health,
Soil Conserv. Service, Dept. of Ag,
HELCO

Date: February 3, 1978

From: Director

Subject: Special Permit Application
Dept. of Planning & Economic Dev.
HGP-A Geothermal Research Facility

Transmitted for your information is a copy of the draft EIS for the geothermal research facility at Puna, Hawaii.

Please submit any comments you may have on this to us relative to the Special Permit application by DPED, or comments you have made directly to OEQC, if you received copies of the EIS directly from DPED.

In addition, if you have no need for the EIS draft after you have completed your review, please return it to us.

Thank you.

Department of Health
February 7, 1978
Hilo, Hawaii

IP:mmk

COMMENTS

Enclosure

No additional concerns found. Our office is supportive of the project's need and projected contribution to our County.

Harold
HAROLD MATSUURA
Chief Sanitarian, Hawaii

EXHIBIT V



COUNTY OF
HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720

HERBERT T. MATAYOSHI
Mayor

SIDNEY M. FUKU
Director

DUANE KANUHA
Deputy Director

February 7, 1978

Dear Property Owner: TMK:

Special Permit Application
Kapoho, Puna, Hawaii
Tax Map Key 1-4-01:portion of 2

You are hereby notified that a request for a special permit to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4 acres of land situated within the State Land Use Agricultural District has been submitted by the petitioner, State of Hawaii Department of Planning and Economic Development.

The property involved is located about one mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, Hawaii.

A public hearing on the subject among others will be held beginning at 7:00 p.m. on Thursday, February 23, 1978, in the Councilroom, County Building, South Hilo, Hawaii.

You are invited to comment on the application at the hearing or submit written comments prior to the hearing date.

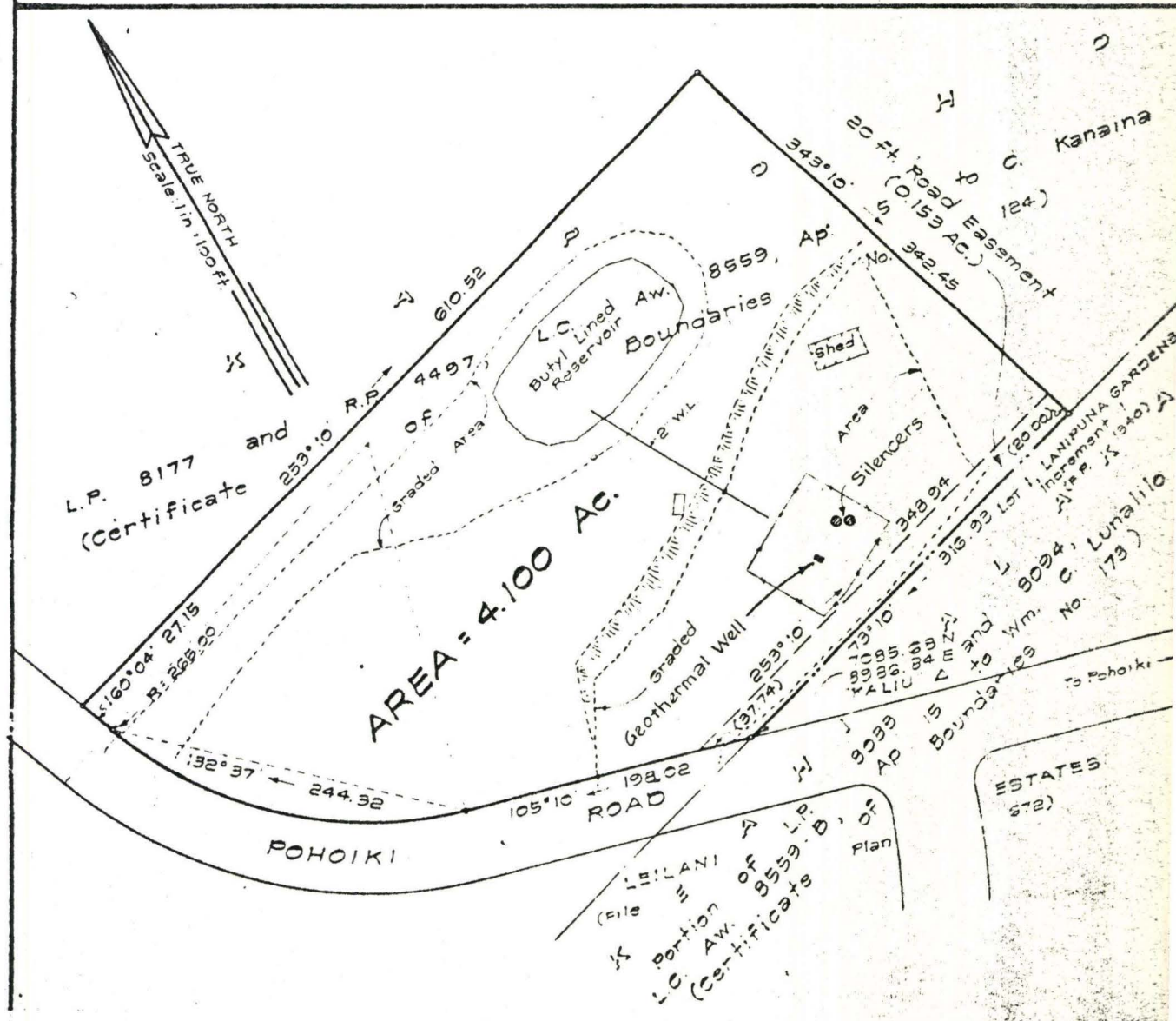
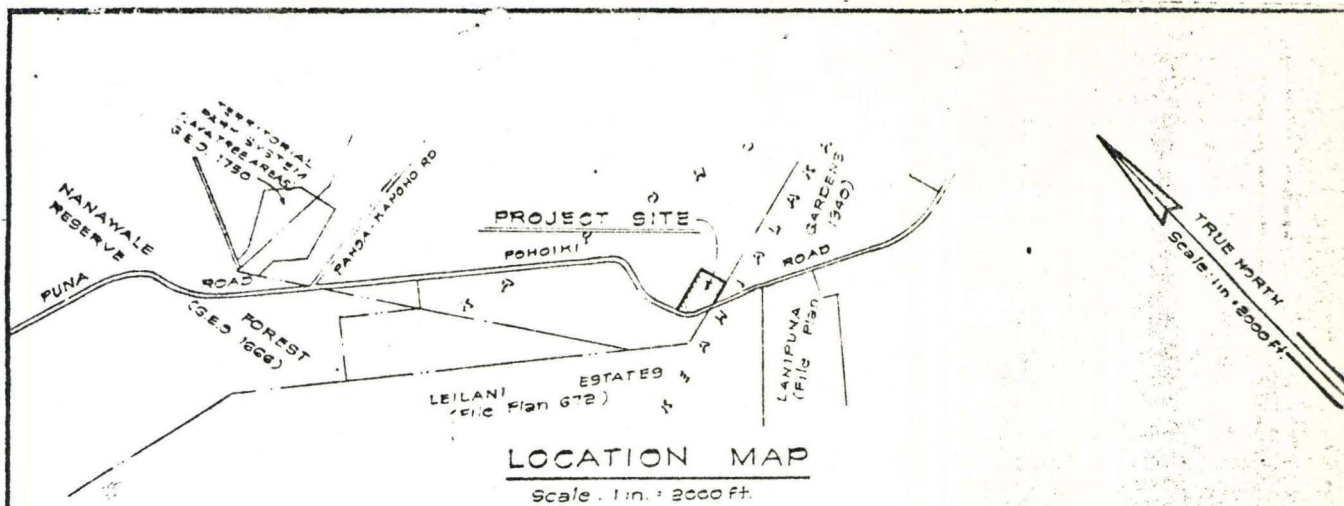
Sincerely,

Sidney M. Fuku
Director

smn

Enclosure

EXHIBIT W



SPECIAL PERMIT REQUEST

TO INSTALL A GEOTHERMAL RESEARCH FACILITY AND TO CONDUCT FLOW TESTS

KAPOHO, PUNA, HAWAII

TAX MAP KEY: 1-4-01: PORTION OF 2

APPLICANT: DEPARTMENT OF PLANNING & ECONOMIC DEVELOPMENT
STATE OF HAWAII

EXHIBIT
W-1

JAN. 18, 1978

2.2/3

SPECIAL PERMIT

DEPT. OF PLANNING AND ECONOMIC DEVELOPMENT
TO INSTAL A GEOTHERMAL ROCKETHEAT FACILITY AND CONDUCT
P.W. TESTS

1-4-01:2 PORTION OF 2 (4.1 ACRES)

(11)

1-4-01:3, 19+1-4-17:9, 10, 11, 13, 7
Kupcho Land+Dev. Co.
P.O. Box 18
Pahoa, HI 96778

1-3-44:5 4 State of Hawaii - DLNR

64, 66, 67, 69, 72, 73, 75
Tokyu Land Dev. Hawaii Inc.
190 So. King St. STE 1180
HON HI 96813

19 Same as 3

unlike reference
20 Puna Ventures
747 Amana St. #21
Hon HI 96814

41 William Chow
Box 92
Pahoa, HI 96778

64 same as 17

66 same as 17

67 same as 17

69 same as 17

72 same as 17

73 same as 17

75 same as 17

1-4-17:7 Same as 1-4-01:3

1-4-17:8, 12, 9
Akira Iwata
1459 Ala Hekili PL.
Hon. HI 96819

9 same as 1-4-01:3

10 same as 1-4-01:3

11 same as 1-4-01:3

12 same as 1-4-17:8

13 same as 1-4-01:3

1-4-18:2, 13
Isamu Iwata
P.O. Box 362
Pahoa, HI 96778

3 Tsuneyo Uyeda
PO Box 347
Pahoa, HI 96778

8 7 Shiro Miyatake wuf
Pahoa, HI 96778

8 same as 1-4-18:7

9 same as 1-4-17:8

~~Isamu Iwata~~
~~P.O. Box 362~~
~~Pahoa, HI 96778~~

1-3-44:4 First Hawn Bank
PO Box 3200
Hon. HI 96813

5 same as 1-3-44:4

EXHIBIT W-2

1-3-44:6 Kazy S. Almenas
729 P
Lowp City, NB 68853

1-3-46:1 ~~DOCKHAM 00. / S.L.~~
~~P.O. Box~~
Waiwanac HI 96792

February 7, 1978

Mr. Hideto Kono, Director
State of Hawaii Department of
Planning and Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Notice of a Public Hearing
Special Permit Application
Tax Map Key 1-4-01:portion of 2

This is to inform you that your request has been scheduled for a public hearing. Said hearing among others will be held beginning at 7:00 p.m. on Thursday, February 23, 1978, in the Council Room, County Building, South Hilo, Hawaii.

The presence of a representative will be appreciated in order that all questions relative to the request may be clarified.

A copy of the hearing notice is enclosed for your information.

Sincerely,

Sidney M. Duke
Sidney M. Duke
Director

smn

Enclosure

cc: State Land Use Commission
Land Use Division, DPED

EXHIBIT X

FEB 8 1978

PUBLIC HEARINGS
PLANNING COMMISSION
COUNTY OF HAWAII

NOTICE IS HEREBY GIVEN of public hearings to be held by the Planning Commission of the County of Hawaii in accordance with the provisions of Section 5-4.3 of the Charter of the County of Hawaii.

PLACE: Council Room, County Building, South Hilo, Hawaii
DATE: Thursday, February 23, 1978
TIME: Item Nos. 1 to 5: 3:00 p.m.
Item Nos. 6 to 7: 7:00 p.m.

The purpose of the public hearings is to afford all interested persons a reasonable opportunity to be heard on the following requests:

1. PETITIONER: HARVEY CARMACK

LOCATION: Approximately 4,500 feet northwest of the Volcano Highway in the Pacific Paradise Mountain View Manor Subdivision, Increment 3, 'Ola'a Reservation Lots, 'Ola'a, Puna.

TMK: 1-8-82:77

PURPOSE: Variance to allow the retention of a single family dwelling with a 5'-8½" side yard setback and a 2'-8½" clear space in lieu of the minimum requirements of 8 and 4 feet respectively for an 8,346-square foot lot.

EXHIBIT X-1

2. PETITIONER: STATE OF HAWAII DEPARTMENT OF ACCOUNTING AND
GENERAL SERVICES
- LOCATION: At the University of Hawaii Hilo College
campus, approximately 800 feet makai of the
existing Adult Student Housing facilities,
Waiakea Cane Lots, Waiakea, South Hilo.
- TMK: 2-4-01:portion of 7
- PURPOSE: Variance to allow the construction of a
gymnasium with a height of 48 feet in lieu
of the maximum limit of 35 feet as stipulated
in the Single Family Residential - 10,000-
square foot zoned district.
3. PETITIONER: COUNTY OF HAWAII DEPARTMENT OF PARKS AND
RECREATION
- LOCATION: Adjacent to and mauka of the Hilo Boys' Club
Complex, Ponahawai, South Hilo.
- TMK: 2-3-20:portions of 2 and 7
- PURPOSE: Change of zone for 7.2 acres of land from a
Single Family Residential - 7,500 square
foot (RS-7.5) to an Open (O) zoned district.
4. PETITIONER: SUISAN COMPANY, LTD.
- LOCATION: Northeastern side of Kealakai Street, approxi-
mately 3,200 feet from Stainback Highway in
the Puna direction, Panaewa Farm Lots, 2nd
Series, Waiakea, South Hilo.
- TMK: 2-4-49:21 and 22

PURPOSE: Special Permit to allow the establishment of a fruit processing plant with retail sales facilities on 20.483 acres of land situated within the State Land Use Agricultural District.

5. PETITIONER: HAWAII ISLAND HUMANE SOCIETY, SPCA

LOCATION: Site of the Keaau Animal Shelter along the east side of the Kea'au-Pahoa Road, approximately 1.5 miles from Kea'au, Kea'au, Puna.

TMK: 1-6-03:74

PURPOSE: Special Permit to allow the addition of kennels and a garage and to legitimize the existing Humane Society Use on 2.8 acres of land situated within the State Land Use Agricultural District.

6. PETITIONER: SUISAN COMPANY, LTD.

LOCATION: On the Hilo side of Kumau Street and approximately 170 feet makai of Kalaniana'ole Street, Waiakea Warehouse Lots, Waiakea, South Hilo

TMK: 2-1-07:3

PURPOSE: (a) Variance to allow the construction of a cold storage warehouse with a 1'-0" rear yard setback in lieu of the minimum requirement of 20'-0" as stipulated within the General Industrial - 20,000 square foot (MG-20) zone.

(b) Special Management Area (SMA) Use Permit to allow the establishment of a cold-storage warehouse facility and related improvements on 22,387 square feet of land.

7. PETITIONER: STATE OF HAWAII DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
- LOCATION: About one mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna.
- TMK: 1-4-01:portion of 2
- PURPOSE: Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4 acres of land situated within the State Land Use Agricultural District.

Maps showing the general locations and boundaries of the areas under consideration and/or plans of the proposed developments are on file in the office of the Planning Department in the County Building at 25 Aupuni Street, Hilo, Hawaii, and are open to inspection during office hours. All comments should be filed with the Planning Commission before that date, or in person at the public hearing.

PLANNING COMMISSION
William F. Mielcke, Chairman
By Sidney M. Fuke
Planning Director

(Hawaii Tribune-Herald: February 13 and 21, 1978)

PUNA SOIL AND WATER CONSERVATION DISTRICT
P. O. Box 612
Hilo, Hawaii 96720

February 8, 1978

Mr. Sidney Fuke, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

The Puna Soil and Water Conservation District Board
has completed its review of the Special Use Permit application
submitted by Hawaii Geothermal Research Station for land parcel
TMK 1-4-02:2 (Por.).

We have attached the resource evaluation prepared by the USDA Soil
Conservation Service containing pertinent soils information.

Other Factors Affecting Development:

Upon completion of our field investigation with SCS technicians, it
has been determined

Please see attached SCS report (memo Cammack-Kaneshiro 1-31-78).

We hope that we have been of some assistance. Please do not hesitate
to call on us for further clarification should the need arise.

Sincerely,



Charles K. Hoopai
Chairman

Attachment

EXHIBIT Y

P. O. Box 1361, Hilo, Hawaii 96720

EIT - EIS - Hawaii Geothermal Research
Station

Jan. 31, 1978

Ken Kaneshiro, Planning Staff Leader

I have thoroughly reviewed the above document.

The entire project lies on an area of KLV Lava flow, As. Any building foundation, septic tank or filter field has a severe limitation due to the lava at surface or near surface depth.

For the proposed settling basins (page 41) to discharge approximately 60 to 100 gallons per minute of liquid, extreme care should be exercised in the design to facilitate the amount and capacity of the proposed basins to avoid any possible contamination of surrounding areas.

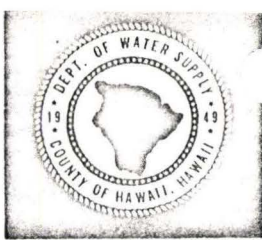
No other comments are offered on this excellent document.

Roy Cammack

Roy Cammack
District Conservationist

Enclosure:
EIS

EXHIBIT Y-1



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1820

HILO, HAWAII 96720

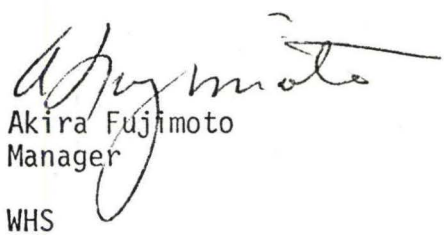
25 AUPUNI STREET

February 8, 1978

TO: Planning Department
FROM: Manager
SUBJECT: SPECIAL PERMIT APPLICATION
DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
HGP-A GEOTHERMAL RESEARCH FACILITY

Enclosed is a copy of our comments to the Office of Environmental Quality Control on this draft Environmental Impact Statement.

Since we have a copy of the EIS on file, we are returning the copy you sent.


Akira Fujimoto
Manager

WHS

Encs.

... Water brings progress...

EXHIBIT Z

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

JOHN FARIAS, JR.
CHAIRMAN, BOARD OF AGRICULTURE
YUKIO KITAGAWA
DEPUTY TO THE CHAIRMAN

BOARD MEMBERS:

ERNEST F. MORGADO
MEMBER - AT - LARGE

Sidney Goo
MEMBER - AT - LARGE

SHIZUTO KADOTA
HAWAII MEMBER

STEPHEN Q. L. AU
KAUAI MEMBER

FRED M. OGASAWARA
MAUI MEMBER

February 14, 1978

MEMORANDUM

TO: Mr. Sidney Fuke, Director
Hawaii County Planning Department

SUBJECT: Special Permit Application
Dept. of Planning & Economic Dev.
HGP-A Geothermal Research Facility
TMK: III 1-4-1:Por. 2

The Department of Agriculture has no comments on this Environmental Impact Statement.

We appreciate the opportunity to comment.

A handwritten signature in black ink, reading "John Farias, Jr.", is written over the typed name and title.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

EXHIBIT AA



DEPARTMENT OF RESEARCH AND DEVELOPMENT

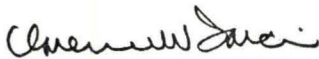
COUNTY OF HAWAII • 25 AUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE (808) 961-8366

February 14, 1978

To: Planning Department
From: Research and Development
Subject: Special Permit Application - DPED, HGP-A Research Facility

Thank you for this opportunity to review and comment on the above-mentioned subject. We offer the following for your consideration.

1. The research facility, as proposed, will address itself to the issues relative to the development and utilization of geothermal resources. It should be noted that geothermal resources represent a potential which could prove to be beneficial to the Big Island community. Determinations must be made to effectively measure the costs (social, economic, environmental, etc.) of such development and the various related benefits.
2. Experience in dealing with the geothermal project has shown that much of the problems encountered with the residents of the Puna District and its attendant negative publicity, could have been alleviated by effective communications. We therefore suggest that a condition be made as part and parcel of the issuance of the S.P. that a general education program be initiated to keep the public informed about the project.
3. As pointed out in the EIS, H₂S smell and noise from the well will be limited as much as practicable in the installation of the generator by utilizing scrubbers. The project leaders should work closely with State Department of Health officials in monitoring smell and noise standards to assure health and safety standards.


CLARENCE W. GARCIA
DIRECTOR

CLW:sk

EXHIBIT BB



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HAWAII DISTRICT
50 MAKAALA STREET
P. O. BOX 4277
HILO, HAWAII 96720

IN REPLY REFER TO:

LT-H 78-2.181

February 15, 1978

MEMORANDUM:

TO: Director, Planning Department
County of Hawaii

FROM: District Engineer, Hawaii

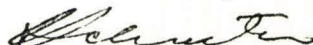
SUBJECT: () Change of Zone Application
() Variance Application
() Subdivision Application No.
(x) Special Permit Application
Dept. of Planning & Economic Development
HGP-A Geothermal Research Facility

Our comments on the draft EIS are as follows:

Page 31:

1. Highway Route Control Section 132 does not pass the site of the project--Route 132 is the Pahoa-Kapoho Road and is paved.
2. Coastal Road Route 130 connects with the Chain of Craters Road.

Returned is the draft EIS as requested.


CHAS L. SCHUSTER

Enclosure

EXHIBIT CC

February 21, 1978

Office of Environmental Quality Control
550 Halekauwila St.
Room 301
Honolulu, HI 96813

Gentlemen:

Draft Environmental Impact Statement
"Hawaii Geothermal Research Station Utilizing
the HGP-A Well at Puna, Hawaii"

We have reviewed the subject draft EIS and have the following general comments to offer:

1. There is no description of the project which the draft EIS is addressing. As a result, the conclusions drawn in the statement are confusing. It is our understanding that the draft EIS is for a specific project, namely, the establishment of the Hawaii Geothermal Research Station which includes equipment and facilities related to the extraction of geothermal fluids from the HGP-A well and a return system; an experimental power plant; administrative facilities; and an R&D facility, consisting primarily of three test pads and related piping. This is the same project for which the Department of Planning and Economic Development has submitted a Special Permit.
2. The draft EIS addresses the potential impact of geothermal research in general, rather than the specific project. This may be misleading in that, for instance, flow tests will be conducted prior to the installation of appropriate abatement controls for noise and hydrogen sulfide.
3. More of the findings of the research upon which the draft EIS is based should be included. We note, for example, that reference to archaeological sites is made on a district-wide basis rather than on a site-specific survey. Use of the general information for such a specific area may be incorrect. In addition to archaeological information, this observation applies to other areas discussed.

EXHIBIT DD

FEB 21 1978

Environmental Quality Control

Page 2

February 21, 1978

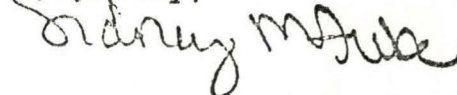
4. The draft EIS does not discuss the various land use classifications, such as the State Land Use District and County zoning. As we stated in our comments on the preparation notice, these should be included.
5. We find that many concerns expressed by various agencies in response to the preparation notice have been included as an appended response to the agencies, rather than being included in the body of the EIS draft. Many of the comments should be discussed in the body of the document.
6. No Appendix B is included, although reference to it is made.
7. It is stated that the County General Plan "makes no mention of the then-undiscovered new energy source". The author is directed to pages 9 and 10 of the General Plan regarding scientific research.

We have also found many discrepancies in the references and conclusions made in the document, particularly as they relate to domestic water supply; population, both existing and potential; housing; and employment generated. Some of these areas have been noted by other agencies.

If the above-cited points could be addressed more explicitly, especially in terms of the proposed action, we believe that the draft EIS could be much improved and the environmental impact, both short- and long-term could be more objectively assessed.

Thank you for the opportunity to review the draft EIS. If we can be of assistance or clarify our comments, please feel free to call on us.

Sincerely,



SIDNEY FUKU
Director

IP:mmk

bcc: Jack Keppeler

Special Use Permit for HGP-A Research Facility
at Puna, Hawaii

LIST OF WITNESSES

Name (List in Order of Appearance)	Expertise	Subject Matter
<u>Testifying</u>		
Frank Skrivanek	Deputy Director, DPED	State policy, role in geothermal development and HGP-A project; summary of Special Use Permit
Jack Keppeler	Managing Director, County of Hawaii	County's role in geothermal development and HGP-A project
<u>Resource</u>		
Eugene Grabbe Esther Ueda	Manager, CSPTA Land Use Division	Status of HGP-A project; details of Special Use Permit
Bill Chen	DPED consultant - temporary Project coordinator Rep. of U.H.	Objectives and overall operations of HGP-A project; U.H. role in geothermal development and HGP-A project.
Robert Kamins	DPED consultant; Economist, U.H.	Environmental Impact Statement
Jitsuo Niwao	Rep. of HECO; technical advisors to project	HECO role in HGP-A; wellhead generator operations
Sandy Siegel	HGP consultant	Environmental impacts of HGP-A project

Testimony of
Hideto Kono, Director
Department of Planning and Economic Development

before the
County of Hawaii Planning Commission

on
Thursday, February 23, 1978

on the Special Use Permit for a
HGP-A Geothermal Research Facility
at Puna, Hawaii, TMK: 1-2-01:2(por.)

The State of Hawaii is generously endowed with natural energy from various sources--geothermal, solar radiation, ocean temperature differential, wind, waves and currents--all potential non-polluting power sources. At the present time, the State is almost totally dependent on imported fossil fuel for its energy needs, over 90% of the State's energy requirements are now being met by imported petroleum products.

Following the 1974 National Petroleum Crisis, there has been increasing concern with respect to Hawaii's almost complete dependence on petroleum shipments. In 1974, the State Legislature passed Act 237 (Chapter 196, HRS) which created a State Energy Resources Coordinator to formulate plans, programs, and financial requirements for the optimum conservation, management and development of Hawaii's energy resources. Subsequently, Governor Ariyoshi designated me as the State Energy Resources Coordinator, and further directed DPED to be the lead state agency in encouraging the development of Hawaii's geothermal energy resources.

Geothermal energy has taken a particularly important role in the State's efforts to develop alternate energy sources. It is felt that geothermal energy, together with bio-conversion, has the most potential for providing electricity and other energy products within the near future. Research projects on ocean thermal energy conversion are on-going, but it will not be until the late 1980's that

EXHIBIT EE-1

such technology becomes available.

Research on geothermal resources in the State began in 1971 by the University of Hawaii, with funding from the State, County and Federal Governments. The island of Hawaii was selected as the site for initial geothermal exploration, inasmuch as it is the largest and youngest of the islands in the State, is still growing, and has the greatest amount of heat at or near the earth's surface. A committee was established and chaired by Dr. A. T. Abbot, to select a site and plan a drilling program. An exploratory survey was conducted of the sites most favorable for geothermal energy. The committee, considered all geophysical, geological, thermal and geochemical evidence, and finally selected the subject site, owned by the Kapoho Land and Development Company.

The drilling of an exploratory well began in December 1975, and by April 1976, a 6,400 foot research well was completed. Tests on the geothermal effluent from the well indicate that it is the hottest geothermal well in the world with temperatures in excess of 600 degrees fahrenheit.

Upon completion of the University's initial geothermal exploration program, the HGP-A Development Group was formed to install a wellhead generator system and to test the feasibility of producing electricity from a volcanically young geothermal resource. The HGP-A Development Group includes representatives from the University of Hawaii Hawaii Geothermal Project, the State, represented by DPED, and the County. Hawaii Electric Light Company (HELCO) is also assisting in an advisory capacity to the Development Group. The Board of Directors of the Group include Paul Yuen, Acting Director, Hawaii Geothermal Project; Jack Keppler, Managing Director, County of Hawaii; and myself as Chairman. The Development Group has recently designated the Research Corporation of the University of Hawaii (RCUH) to act as the administration agency for the HGP-A project.

The subject Special Use Permit will 1) permit further tests to be conducted at

the Puna HGP-A Geothermal site to define the nature and extent of the geothermal resource in Puna, 2) permit construction and operation of a wellhead generator system and 3) demonstrate how the geothermal resource may be used in the electrical and non-electrical applications.

The proposed use will include two basic facilities--the wellhead generator and the research facility. The proposed wellhead generator will have a capability of producing up to 5 megawatts of electricity and will test the commercial electricity generation capabilities of the geothermal resource. The HELCO has agreed to operate the wellhead generator facilities and to purchase up to 5 megawatts of electricity from the project. Agreements will be entered into with the RCUH. An anticipated Federal grant of over \$6 million plus \$400,000 of State and \$100,000 of County funds will finance the wellhead generator system. At the present time negotiations are underway between the Department of Energy and the RCUH on a contract for the project.

The proposed research facility will test both electric and non-electric applications of the geothermal resource. Hot water and steam could be used for food processing, aquaculture and processing fruit and fruit juices. DPED has submitted a request to the Legislature for \$350,000 to fund this research facility.

As part of my testimony on behalf of the Department of Planning and Economic Development, applicant for the Special Use Permit, we are requesting several amendments to our Special Use Permit at this time. These changes have resulted from new developments in the project since the application for the Special Use Permit TMK: 1-2-01:2 (por.) was filed in November and are as follows:

1. Our application states that HELCO has agreed to purchase $1\frac{1}{2}$ to 2 megawatts of electricity. This should be changed to "HELCO has agreed to purchase 2 megawatts of electricity on a continuous basis and up to 5 megawatts under certain conditions." The lower figure was set when

the use of a used turbine generator from a sugarcane power plant was under consideration. The U. S. Department of Energy (DOE) wants to use new equipment and also believes that the well will increase its output with use so that 5 megawatts might be reached in output as the well is used. The capacity of the turbine generator has not been established but will result from negotiations now underway with DOE. It would be to the advantage of the County and its citizens, the State and DOE to have the largest feasible capacity turbine generator specified for the project. Increased income to the research project will result.

2. As a result of discussions with the U. S. Department of Energy a Visitors Education Center has been added as a part of the project. This center would be located on the site and would serve to explain geothermal energy resources and how the energy is tapped and utilized for both electric and non-electric uses. As an unmanned exhibit it would include color photographs, text and possibly audio-visual aids as the educational medium. It would be oriented toward citizens, students, visitors and tourists. It could prove to be a major tourist attraction for the Hilo-Puna area. The funding proposed for the Visitors Education Center is \$100,000 of which \$20,000 would be devoted to landscaping. The location of the center will be specified in the development of the detailed plant layout. Such a Visitors Education Center also fits in with the Big Islands planning for energy self-sufficiency.
3. Our application states that the 4.1 acre site will be leased from Kapoho Land and Development Co., Ltd. However, since the application was filed, plans have changed, and at the present time negotiations

are underway for the State to acquire the property in fee.

The proposed project is an important step in the State and County's joint efforts to develop our geothermal resources. I ask for your favorable consideration of this Special Use Permit and the ^{three}~~two~~ proposed amendments.

In my testimony, I have not attempted to go into the details of the Special Permit application, however, I would be happy to answer any questions you may have on the project. I have with me here tonight, several resource persons involved in this project who will assist me in answering any detailed questions you may have.

Thank you for the opportunity to testify on this Special Use Permit.



HERBERT T. MATAYOSHI
MAYOR

February 23, 1978

Chairman William F. Mielcke,
and Members of the Hawaii County
Planning Commission

My name is John P. Keppeler, I am the Managing Director of the County of Hawaii and, in that capacity, I am representing the Mayor of the County of Hawaii and the majority of the Hawaii County Council. Further, I represent this government in the consortium of interests that make up the Hawaii Geothermal Project/Development Group (HGP/DG) that is charged with the exploration for, the assessment of, and the useful demonstration of geothermal resources for electric and nonelectric applications.

Hawaii County has been a party to this natural resource development enterprise for more than five years. The successful geothermal well, HGP-A, on the lands of Kapoho, Puna, Hawaii represents for this community, in our opinion, the beginning of an opportunity for a favorable energy future for Hawaii. The vision of those that urged the initiation of the Hawaii Geothermal Project can now be more clearly understood in that we have a producing well - the hottest and cleanest geothermal find in the world, to date.

This success should encourage us to embark on a process to demonstrate the practical uses of this natural energy source. The special permit application before you requires your favorable action

EXHIBIT EE-2

Chairman William F. Mielcke
Page 2
February 23, 1978

in order to allow the Development Group to continue the clearing away of unknowns that veil a complete view of our geothermal potentialities.

We all had a startling awakening in 1973 or 1974 to the realities of diminishing fossil fuels - oil, gas, and coal - and how dependent and sensitive our modern economy was, is, and will be on the energy sources that drive it. The OPEC Nations' price escalations on oil that will continue into the future has caused us, as a nation, to begin the serious business of adopting and adapting new energy sources and practices to assure a continuation of our economic well-being. This project is a part of that national concern; the majority funding source has been and will continue to be the Federal Government.

This project is considered to be a vital cornerstone in the drive for this island community, Hawaii County, to be able to achieve greater energy self-sufficiency, with prosperity, within this century. The U. S. Department of Energy is about to announce its intention to highlight the Island of Hawaii or the County of Hawaii as a demonstration community for the national effort to find alternative energy sources to drive our future requirements from solar, wind, biomass, hydropower, ocean power and, certainly neither last nor least, geothermal power resources. This island's abundant natural resources from the sun, sea, climate and its volcanic origin coupled with an innovative citizenry nominate the Big Island of Hawaii for

Chairman William F. Mielcke
Page 3
February 23, 1978

national and international attention to how we solve, with State and Federal assistance, the problem of converting our shipped-in, oil dependence to using natural energy sources found here at home without significant socioeconomic disruptions.

The special permitted use in agriculturally zoned land, at this point in time, for a geothermal research and demonstration project does not, in our opinion, significantly disrupt the existing use of the surrounding area. There are, however, long-ranged, land use implications that can find clearer definition with this R&D project, especially when information is available from it about commercial, nonelectrical applications of geothermal steam and/or fluids.

Further, we have been assured that the environmental impacts from sights, sounds, smells and waste fluids can be technically and economically ameliorated to minimize the change that this project will bring to this part of the Puna District.

It is therefore recommended that you act favorably on this request, not because it is benign or innocuous but because it is new and constructively challenging. We strongly urge the community's support of this facility, as we believe it will lead us to a greater understanding of what the future may hold in store for us.

Date February 23, 1978

Petitioner STATE OF HAWAII DEPARTMENT OF PLANNING AND ECONOMIC
DEVELOPMENT - Special Permit

Preliminary hearing ☒ Public hearing ☐ Request ☐ Action ☐

ACTION: Approve

Deny

Defer

✓ Continue til EIS approved by Gov.

Schedule for public hearing

Other: _____

Commissioners	Aye	No	Excused	Abstain
FUJIMOTO, Shigeru			✓	
HANLEY, J. Walsh			✓	
JITCHAKU, Lorraine R. Moved	✓			
MURAKAMI, Haruo	✓			
NAKANO, Bert H.	✓			
ORITA, Alfredo	✓			
PARIS, William Jr. 2nd	✓			
SAKAMOTO, Charles	✓			
MIELCKE, William F.	✓			

EXHIBIT FF

PLANNING COMMISSION

Planning Department
County of Hawaii

MINUTES
February 23, 1978

The Planning Commission met in regular session at 10:00 a.m. in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke presiding.

PRESENT: William F. Mielcke ABSENT: J. Walsh Hanley
Shigeru Fujimoto (Left at 3:00 p.m.)
Lorraine R. Jitchaku
Haruo Murakami
Bert H. Nakano
Alfredo Orita
William J. Paris, Jr.
Charles Sakamoto

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Ilima Piianaia, Planner
Keith Kato, Planner (Left at 5:00 p.m.)

David Murakami, representing Ex-officio Member, Edward
Harada (Left at 3:0 p.m.)
Quirino Antonio, representing Ex-officio Member, Akira
Fujimoto (Left at 11:30 p.m.)
Lionel Meyer, Deputy Corporation Counsel (From 7:00 p.m.)

and about 10 people at 10:00 a.m., 13 people at 3:00 p.m.,
and 7 people at 7 p.m.

Exhibit GG

SPECIAL PERMIT
DEPARTMENT OF
PLANNING AND
ECONOMIC
DEVELOPMENT
KAPOHO, PUNA

located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2.

- Public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4 acres of land

Staff presented background information on file.

The petitioner's representative, Mr. Frank Skrivanek, Deputy Director for the Department of Planning and Economic Development, read and presented Mr. Hideto Kono's statement on file.

Mr. Skrivanek informed the Commissioners that they anticipate final approval of the EIS about the end of April and that this facility was much smaller in scale compared with the facilities operating in New Zealand, Italy or Greenland.

Those present as resource personnel for the DPED were: Eugene Grabbe, Esther Ueda, Bill Chen, Robert Kamins, Jitsuo Niwao and Sandy Siegel.

Mr. Bill Chen said he did not foresee any problems of starting or flowing the well again.

Mr. Eugene Grabbe showed various diagrams of what a geothermal well and facilities looked like and explained the process. He pointed out that because of the noise problem, a silencer is attached in areas where they have the geothermal facilities. Mr. Grabbe went over the plans and system for the Hawaii geothermal test facility and added he thought the remainder of the 4.1 acres would be left in its natural state.

Mr. Bill Chen said that what is proposed is just a conceptual scheme as the system has not really been designed as yet; however, the actual facility would not differ very much. He pointed out that there might be two things that would be different. One is that they are proposing to inject the water back to the reservoir; and, therefore, they would need a drainage pump. Another is that they may change from an iron catalyst system to a different kind of hydrogen sulfide abatement system. Mr. Chen added that they did not foresee exceeding the maximum height of 53 feet for their tower.

Mr. Grabbe pointed out that the tests are planned during the daytime so that people will be away from their homes for the most part.

Mr. Sandy Siegel commented on the effects of H₂S and Mr. Chen stated that no continuous tests will be conducted until such time that a better noise or odor control system is installed.

Mr. Jitsuo Niwao commented that he presumed that the generator that would be used would be the low temperature, low pressure type of turbine (below 200 pounds of pressure) similar to the type the plantations use, but that it would be considerably more quiet. He added that 1 megawatt would serve approximately 1,000 to 1,500 homes.

Mr. Jack Keppler, Managing Director for the County of Hawaii, read and presented his written testimony on file.

Staff stated for the record that the diagrams described by Mr. Grabbe were not being submitted as exhibits.

Commissioner Jitchaku suggested a section be added that in case something is missed that is not included as part of this project,

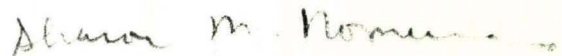
rather than stopping the project, whatever is contained within this 4.1 acres be included or considered with the Planning Director's and County of Hawaii's input. Staff responded by saying that rather than giving an open-ended approval without really knowing the magnitude, if anything else is planned for the remainder 2.3 acres, it would be appropriate for the petitioner to come back and amend the Special Permit - because if it is left open-ended, the review powers of the Commission may be limited.

It was moved by Commissioner Jitchaku and seconded by Commissioner Paris that the public hearing for a Special Permit be continued until such time as the EIS is finalized. A roll call vote was taken and motion carried with seven ayes.

ANNOUNCEMENT: Next scheduled meetings are March 8 and 9 in Kona and Waimea and March 22 in Hilo.

Meeting adjourned at 9:00 p.m.

Respectfully submitted,



Sharon M. Nomura

A T T E S T :



William F. Mielcke
Chairman, Planning Commission

PLANNING COMMISSION

Planning Department
County of Hawaii

HEARING TRANSCRIPT
February 23, 1978

A regularly advertised public hearing, on the application of the State of Hawaii Department of Planning and Economic Development, was called to order at 7:33 p.m. in the Councilroom, County Building, South Hilo, Hawaii, by Chairman William F. Mielcke.

PRESENT: William F. Mielcke
Lorraine R. Jitchaku
Haruo Murakami
Bert H. Nakano
Alfredo Orita
William J. Paris, Jr.
Charles Sakamoto

ABSENT: Shigeru Fujimoto
J. Walsh Hanley

Ex-officio Member
Akira Fujimoto
Ex-officio Member
Edward Harada

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Ilima Piianaia, Planner

Lionel Meyer, Deputy Corporation Counsel

and about 13 people in attendance

CHAIRMAN: We'll proceed with public hearings, Number 7. Public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4 acres of land located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2. Staff?

PIIANAIA: (Presented background information on file.)

I'll circulate a small exhibit showing the proposed facility, but I believe the petitioner has a larger scale poster of this. Thank you.

CHAIRMAN: Thank you very much, Ilima. Members, of the Commission let's just review for a second before I open the floor for discussion. Again, a special permit. The purpose of a special permit is to use the land within the State Land Use Agricultural or Rural District for other purposes than uses permitted within these districts. The Planning Director's role is to make recommendations to the Commission and the Planning Commission's role is advisory of recommending approval, adjudicatory, if denial. We are to conduct a public hearing, after 30 days but within 120 days of the receipt of the petition in order to afford the Commission an opportunity to receive information from the staff and from the petitioner. Will be taking public testimony this evening. However, as was stated in the background report and

Exhibit HH

I quote, "To date a final EIS has not been approved. Action cannot be taken by the Planning Commission till a final EIS has been approved." I would recommend to the Commission that the public hearing, at its conclusion this evening, be continued.

At this time, I would like to ask those members of the Commission if you have any questions of the staff's background report? If there are no questions of the staff's background report, I have had requests from two persons to provide testimony this evening and I will call them first and then we'll open up to the floor those persons who also wish to comment on this application. The Chair at this time would like to call Mr. Frank Skrivanek, the Deputy Director of DPED.

Mr. Skrivanek, we will swear you in. Do you swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

SKRIVANEK: I do.

CHAIRMAN: Will you please be seated and state your name into the microphone.

SKRIVANEK: Yes, my name is Frank Skrivanek, I'm the Deputy Director for the Department of Planning and Economic Development. I'm here to present public testimony on behalf of Mr. Kono, our Director who left for Washington, D. C., last night to participate in a national energy conference preceding the national governors' conference. This is an energy conference which was scheduled with the White House last November, but got postpone because some difficulties in Congress on acting on the energy bills. So it has been rescheduled and on behalf of Mr. Kono, I would like to present testimony.

I think, Mr. Chairman, as you had indicated earlier, in our petition we are also asking Mr. Keppler to present testimony and then we do have a number of people here for resource persons who may be able to answer detailed questions that you might have. Dr. Grabbe who is the manager of our Center for Science Policy and Technology Assessment; and also Ms. Esther Ueda who is with our Land Use Division of the Department; Mr. Bill Chen who is a project coordinator representing the University of Hawaii; Dr. Kamins who prepared the environmental impact study; also Dr. Siegel is here who has worked with him; and from HELCO we also have Mr. Niwao and Mr. Uemura, they are technical advisors to the project. So at this time I would like to present our written testimony and I think we do have one correction which I'll call to your attention when we get to that point. This is for the Special Use Permit for the geothermal research facility at Puna which was identified earlier by your staff.

(Mr. Skrivanek read and presented Mr. Hideto Kono's testimony, copy on file.)

CHAIRMAN: Thank you, Mr. Skrivanek. Members of the Commission, do you have any questions of Mr. Skrivanek at this point?

JITCHAKU: I have one question, Mr. Chairman.

CHAIRMAN: Commissioner Jitchaku.

JITCHAKU: I'm not sure if Mr. Skrivanek should be directed this question; however, the present facility has been idle for some time, do you foresee any problems in relation to the start of the operations?

SKRIVANEK: Due to it being idle, I would think not, but I would check. Would there be any -?

GRABBE: I think Bill Chen is our expert on that.

CHAIRMAN: Okay, Mr. Skrivanek, I think to help the Commission if they have questions, I'm going to ask all of your resource personnel to come up and be sworn in and then if there are questions that have to be answered by a particular individual, we can do that.

SKRIVANEK: Mr. Chairman, I should have mentioned we also have some diagrams which may be of interest to the Members of the Commission.

CHAIRMAN: Fine. The staff would be happy to assist you with the diagrams and put them up on the bulletin board. Members of the resources personnel, if you would all stand up, I'd like to swear you in at this time. Do you all swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

PERSONNEL: I do.

CHAIRMAN: All right, for purposes of identification we'll go from left to right and begin with yourself, sir.

GRABBE: My name is Gene Grabbe with the Department of Planning and Economic Development.

CHAIRMAN: Mr. Grabbe.

UEDA: I'm Esther Ueda with the Land Use Division of DPED.

CHEN: My name is Bill Chen. I'm with, this year on leave from the University of Hawaii with the Department of Planning and Economic Development and I'm also the Acting Project Coordinator for the well and generator program.

CHAIRMAN: Thank you.

KAMINS: I'm Robert Kamins, consultant with DPED.

SIEGEL: Sandy Siegel, University of Hawaii, environmental specialist.

NIWAO: I'm Jitsuo Niwao with HELCO.

CHAIRMAN: Thank you, Mr. Niwao. Okay, Commissioner Jitchaku, if you would like to rephrase your question? You had asked a question about phasing of the facility at the present time and whether there are any problems that are anticipated.

JITCHAKU: Okay, we'll direct this question to Dr. Chen then. Dr. Chen, do you foresee any problems with starting of the project, you know, since the project has been shut down for some time. We were wondering if you can foresee any problems or I'm sure with all our resource people and, you know, you may overcome some problems.

CHEN: No, I don't foresee any problem of starting or flowing the well again. The reason is, at this time, we have a positive well-head pressure of approximately 80 to 90 pounds. So any time we want to start the well, we can turn the valve and it will flash. But we usually will flow it very slowly for about 2 days to warm up the casing. We don't want the casing to crack so we very slowly warm it up and then after 2 days we can flash it at any time we wish.

JITCHAKU: Thank you.

CHAIRMAN: Thank you. Commissioners, any further questions of Mr. Skrivanek or the resource personnel? Commissioner Murakami?

MURAKAMI: Maybe I should ask this question to the Deputy Director or the coordinator of the, I forgot what his name was.

SKRIVANEK: Frank.

MURAKAMI: But as you stated in your statement here, "To date a final EIS has not been approved. Action cannot be taken by the Planning Commission until the final EIS has been approved." How soon do you think that the EIS will be completed and approved?

SKRIVANEK: The EIS has been submitted to the Environmental Commission and it is in the 30-day review process. After they formulate, well, it's open for comments. Then after that 30 days, we have 2 weeks in which to respond to comments. Then the Environmental Commission will make its recommendations to the Governor who has the final sign off on it and we would expect this would be about the end of April, sometime in April. So I think this is one of the reasons that the Chairman has indicated the hearing to be held open until there is final approval on the Environmental Impact Statement.

CHAIRMAN: Mr. Skrivanek, I was looking at a document that was circulated among the Commissioners and just from a layman's standpoint, how does this facility as it's shown way down here, compare with some of the geothermal energy facilities that are operating say in New Zealand or Italy or Greenland. Is it the same or a similar type of facility?

SKRIVANEK: This, of course, is much smaller in scale because we're talking just about a test and research facility at this time. I am familiar only personally with the one in New Zealand which I visited last December and this one is built right across the street from one of their resort hotels. It's an inland resort area and the area covers probably in the neighborhood of 50 to 100

acres; and you see steam coming up. This is, I guess, the pressure is somehow released and there's an escape valve. You don't hear any noise from it. You can drive all in through there, and then it is piped, the distance looks about half a mile or more to the electric generator which looks like a typical power plant. It's all enclosed and again the only thing you hear there is just the turbines, the hum from the turbines; and surprisingly, as much publicity as that one, has had, it really attracts very few visitors. I guess because most of them in this area are people who live in New Zealand rather than foreign visitors. They, perhaps have seen it so many times that they're gotten accustomed to it. But out on the fields, you see the pipes coming from the wells and they do have the bins in them for the expansion joints, but otherwise the landscape is just as it was in its natural form. They haven't cut down, graded or anything of that nature. The only thing is you see the pipes and the steam. So ours here is a very small project compared to that. I have not seen the geysers in California although Dr. Grabbe is familiar with that.

CHAIRMAN: Would you care to comment on that, Dr. Grabbe?

GRABBE: Well, if you don't mind, I'll tell you with pictures I have that would lead into the present facility, which I have a larger chart here, and I can point out the various parts of it.

CHAIRMAN: That'll be fine.

GRABBE: This picture is merely an artists' conception of what a geothermal well is like. It's often been called nature's earth heat. You have hot magma down below and here's a flow of hot magma. The hot magma down here is the source of the heat, that's the earth's heat. In order for the pressure to be built up, there must be some layers of rock which are relatively impermeable, sort of a cap which makes the tea kettle. And if we drill through this and there's water that has percolated down here from some other point, flows in, is heated up when the drilling is done and this releases the steam and it comes out. And here it shows just typically a silencer/separator and a electric power plant with some re-injection. Some of you may have visited the well when it was being flowed for the first time, first few times. There was no silencer on it at that time and it made a lot of noise. It was very spectacular and very important. At that time the U. S. Department of Energy issued publicity statements about our well in Hawaii. So that was a historic moment when it was tapped and steam really came up.

This shows the test facility as it now stands. In the last picture you just saw the well. Since that time because of the noise problem, there has been a silencer attached and these are two large steel towers, very much like an automobile muffler. They are baffles and the steam goes around it and then eventually comes out the top. But the main, and it goes a very effective noise silencing. You can still hear a hum but it's a good silencing job. These are the mufflers that are used in New Zealand and also at Sierra Brit or in Mexico where they have facilities.

Finally, this is the proposed sketch of the geothermal test facility here for Hawaii. Now in a typical power plant, you have a steam boiler which provides the steam for the turbines and in a geothermal power

plant, the steam is provided by the well so you don't have a boiler or a smokestack and things of that sort. Also, most power plants are located, which burn oil, fossil fuel, are located near water areas where they can use water for cooling. Here in Hawaii, they're usually along the coast so that seawater is used for cooling. For a geothermal power plant, you must put the plant where the geothermal is, and usually there isn't a lot of free flowing cool water there. So that is the reason for cooling towers. So here is where the current well is located. As the steam comes up, it goes into a separator because there's a combination of steam and water. From there it goes over and runs the turbine and then after it comes through the steam is condensed and then it goes over to these three buildings over here which are the cooling towers. And those are things that you don't usually see at a conventional power plant. But they're very similar to those New Zealand or the Geysers in California.

Now, the biggest structure you see here is the test facility for testing electric and non-electric uses of geothermal energy and we visualize sort of three bays which were described by the staff. In these, we can carry out experiments on using heat to dry vegetables or for drying grains or coffee, you know, various agricultural purposes. We might set up some aquaculture experiments in these; and there are quite a variety of things that can be done. So that is the purpose of that.

The first item mentioned by the staff was some office buildings and the shop and storeroom. Those are the little buildings over here. The education visitors center is not shown on this plan because we didn't have it in as part of our original proposal, but the Department of Energy is very conscious of a successful project and I think the County too should be very proud of this. It would make a very nice addition to the project. As the facility is laid out, the appropriate location would be picked to put the visitors center so it's convenient for the public and parking and that sort of thing. Are there any questions about this?

SKRIVANEK: Gene, one question, I don't think you responded to the Chairman's question, how does this compare with the Geysers in size and scale.

GRABBE: Oh, it's much smaller because the typical plant of the Geysers is 55 megawatts which means cooling towers are about as large as this building; and there will be two or three of these at one site. Whereas, the cooling towers that were mentioned by the staff, I think are relatively smaller structures.

CHAIRMAN: It covers the principles of the thing?

GRABBE: Yes.

CHAIRMAN: Okay, Commissioners? Commissioner Paris?

PARIS: Oh, yes, I know in the statement you said you'd have a place in there where the sulfur would be removed, etc., where about would that be located in relation to this schematic?

GRABBE: This desulfuring unit is relatively a small unit over on the side there, and it was mentioned that there be a number, a lot of piping around because the steam from the condensers goes back to be desulfured before it goes into the cooling towers.

MURAKAMI: Mr. Chairman?

CHAIRMAN: Yes, Commissioner Murakami.

MURAKAMI: You know, on this cooling system, how do you cool, without water or with water? Do you have water in the cooling system?

GRABBE: Well, when the steam is condensed, part of it is used for cooling. The steam, you have to have some water to start with, but once you have the steam condensing, then you cool it and use that water, recirculate it for the condensers.

MURAKAMI: Oh, after you extract the water from the steam, you use that water for cooling?

GRABBE: That water is used for cooling, yes. About 20 percent of the water is lost in the process of cooling. Now, since we have such a hot well, we anticipate that when the steam comes out of the turbine and is condensed, there will still be quite a lot of heat. And we hope to extract that and put it to some useful purpose. At present, it's considered that we may not need a re-injection well but we can just, water seems to be a good quality and might even be used for agriculture or aquaculture.

MURAKAMI: But during the process, actually you have to have a certain amount of water before you can extract water from the steam, no? In other words, you have to have water in the cooling system when you actually start?

GRABBE: Yes, I should mention that this is a water-dominated system. It's not dry steam. So 40 percent of the material that comes up is water, and 60 percent is steam, is that right, Bill?

CHEN: Yes, to start out, you will have to have water, and then also we have to have some water for makeup, but the amount is very, very small for makeup. Most of the water will be recirculated.

MURAKAMI: Well, let me ask you, about how many gallons would you need in order to run this type of generating plant?

CHEN: At this time, I really can't answer you because of a lot of factors that we have not considered on the design. We have to get an engineering service contractor to design this system and we have to decide how big a system we want and what kind of cooling system and, you know, basic concept is what we have proposed here. But details as to exactly how many gallons, I really can't tell you at this point.

PIIANAIA: Mr. Chairman, I have a couple of questions. Dr. Chen just mentioned that what has been presented is a conceptual scheme and

that the proposed system has not really been designed yet. Do you have any idea how different from the proposed conceptual scheme the actual facility might be?

CHAIRMAN: Who would like to respond to that? Dr. Chen, would you like to respond to that?

CHEN: Yes, yes, I'll respond to that. The actual facility as I can see it now will not differ very much from what we have proposed here. There might be two things that might be different. One is we have not or we are proposing to do a study whether to re-inject, I shouldn't say re-inject, to inject the water back to the reservoir or to surface disposal and if we're going to inject it back to the reservoir then we need to drill a well for doing that; otherwise, we need a drainage pump.

PIIANAIA: Is that well, for the return system, is that well part of this application?

CHEN: If it's necessary to drill a well to dispose of the water, yes; then it will be.

PIIANAIA: So this would be a fourth amendment to the Special Permit application? It's not very clear in the application that there would be another amendment to the application.

GRABBE: I think that is correct because part of the decision will be that of the Department of Energy. They may wish to try re-injection as part of this system.

CHAIRMAN: Maybe we should note that.

PIIANAIA: Okay. May I proceed?

CHAIRMAN: Please.

PIIANAIA: Will the proposed facility, the research station, be confined within a 200 by 400 foot area, within approximately 1.8 acres? Do you foresee it extending beyond?

CHEN: Well, at this moment, I don't foresee it.

PIIANAIA: Okay.

CHEN: Let me, maybe I should continue, there's another possibility of things that might be different from this conceptual design. We also talked about a H₂S abatement system or hydrogen sulfide abatement system and the system that we have provided here is an iron catalyst system. There's a possibility and there's a good possibility that there are better H₂S abatement systems available since we made our first application. So we also have proposed a study in the research to study the best way of getting rid of the hydrogen sulfide. So there's a possibility that the hydrogen sulfide abatement system would not be exactly the same as it is right now.

PIIANAIA: So if you don't use an iron catalyst system or an iron catalyst process for your H₂S abatement system, structurally do you think another system would be different?

CHEN: Yes. It might require, as to exactly what kind of difference I can't tell you at this moment, but there's one system that's under consideration. It's called "Stretford Process". It's been used in all the new Geyser steam plants right now and it will be a little different.

PIIANAIA: For your cooling towers, the application says that you project a maximum height of 53 feet, do you foresee, exceed, for towers, cooling towers, exceeding 55 feet? Because within the Agricultural zone, under the County Zoning Code, there is a 55-foot height limit for towers and if you do foresee anything higher than that, you will have to make it part of the record now or eventually we might be talking about a variance for anything higher that is not included if this permit is approved.

CHEN: I don't think it will be exceeding that.

PIIANAIA: The parcel under consideration or the area under consideration is 4.1 acres. The research station is expected to occupy approximately 1.848 acres, what will the rest of the area be used for and what is there now?

GRABBE: The rest of the area will be landscaped. As mentioned there would be a redwood fence around the facility. I think around the periphery, there will be a chain-linked fence also.

PIIANAIA: Outside of the fence, there's a pond now, a holding pond, I understand.

GRABBE: The pond will be inside the fence, inside the chain-linked fence.

PIIANAIA: Okay, outside of the facilities that's shown on your schematic, there really wouldn't be any use of the parcel or the remainder of the 4.1 acre area?

GRABBE: Well, we'll try to make it as beautiful as possible.

PIIANAIA: No, in terms of use.

GRABBE: We have no planned use for it. The County may have some ideas. Parking is one of the needs, certainly at the visitors center. We haven't considered that, I guess. We should probably put that in as another amendment.

PIIANAIA: I don't think I'm getting the answer I'm looking for. We have 4.1 acres under this Special Permit application. Of that 4.1 acres, everything that's been shown is expected to occupy approximately 1.8 acres and this would be on the more mauka side of the area. On the makai side, what would the use be if there is anything proposed? You know, why is this not confined to 1.8 acres instead of being a 4.1-acre area?

GRABBE: Well, the reason, when the University arranged for a parcel of land, they picked an area and how it was established exactly, I don't know. But the site which was given to the, not given, but access to the 4.1 acres was granted by the Kapoho Land for the purpose of drilling a well and testing it; and so in continuing the project, we just kept to that 4.1-acre area which is the original Kapoho agreement. I think the rest of the land would be left in its natural state. There will be landscaping which we feel will be desirable to make the facility attractive.

PIIANAIA: Thank you. Thank you, Mr. Chairman.

CHAIRMAN: Thank you, Ilima. Getting back to the scrubbers, Dr. Chen, the new units that you say are in operation at other facilities are they appreciably larger or smaller than the ones that you are proposing?

CHEN: I think they're approximately the same size. But there might be new facilities, you know, for example, I believe in the "Stretford Process" you don't need to have a sludge removal system, but you have to have another unit to apply the "Stretford Process". So I think, in total, structure wise it will be approximately the same structure.

CHAIRMAN: Okay, thank you. Commissioners, further questions? Commissioner Paris?

PARIS: In regard to subparagraph B, on page 7, you anticipate a nine-month construction period and during that time it's stated that you will have tests going before, effective equipment to control noise and odor are in effect, and you give the time limitation; but then further on down it says you may have these things in operation within a year and a half after the project start date, so that means you will be probably running this for about six to eight months without the more effective devices to control noise and odor. I'm just trying to interpret that.

PIIANAIA: What Commissioner Paris is referring to is the equipment shakedown tests.

CHAIRMAN: Who would like to respond to that?

GRABBE: I think the tests are planned during the daytime so that people will be away from their homes for the most part and there is noise of traffic and aircraft and other noises. At night was the time that the sound was most, even though it was a low muffled sound in a quiet area like Puna, it can be very distracting if it's continuous. So all the tests are planned during the daytime. I think Dr. Siegel can probably comment on the effect of H₂S or hydrogen sulfide.

CHAIRMAN: Dr. Siegel?

SIEGEL: We've had experience now on several occasions of seeing our test procedures from the warmup through flowing and

flashing experiment, and this has involved direct measurements of hydrogen sulfide right in the plume. And just in terms of concepts of environmental pollution, you can't possibly go higher anywhere in an area than in the plume itself, in terms of parts per million of pollutant. Because everything else has to be air diluted from that, even if the cloud that emanates bounces around the country side a little bit.

We've never been able to get up to OSHA standards in terms of personnel at the site, right in the plume at the wellhead, so we've had to work to be in violation there.

With respect to general ambient quality standards, a mere 100 meters away with new and sensitive detection equipment, we're down below the 30 parts per billion level of hydrogen sulfide of which the EPA now has its tightest requirements. And so by the time we get to a kilometer distance, a half a mile or thereabouts, we're still unfortunately in the human nose level. This is simply a matter of biology. Except for the most supersensitive laboratory detection equipment, the human nose is one of the best detectors of hydrogen sulfide. But we are far, far below by the factor, easily 100, any possible dangerous level and this is our primary concern.

Now, I'm talking about the condition, the well as it exists now and will exist before the abatement equipment is put in. After that, well, this would be a whole different situation with respect to anything even smellable in the vicinity, except for those personnel on the site.

CHAIRMAN: Thank you. Dr. siegel.

CHEN: No continuous test will be conducted until such time that a noise or much better noise or odor control system is installed.

CHAIRMAN: Thank you, Commissioners?

SAKAMOTO: I have one.

CHAIRMAN: Commissioner Sakamoto?

SAKAMOTO: Going back to noise, what type of turbine generator you're going to use? Like the plantation turbine generator makes a loud whistling sound, really hurts the ear.

CHAIRMAN: Mr. Niwao.

NIWAO: Yes, I presume that the generator that's going to be used, the low temperature and pressure type of turbine. The type that we have in our power plant is a high pressure, high temperature type with superheat. But this one, I think is going to be about below 200 pounds of pressure. So I think it's more something like the plantation type of turbine, but it would be a more modern model of that generator.

CHAIRMAN: And considerably more quiet?

NIWAO: I would presume so. Yes.

CHAIRMAN: That was really what your concern was, Commissioner Sakamoto?

SAKAMOTO: Yes.

CHAIRMAN: Commissioners, any further questions?

MURAKAMI: Mr. Chairman?

CHAIRMAN: Yes, Commissioner Murakami.

MURAKAMI: Maybe this question should be asked to Mr. Niwao. When the HELCO purchase the 1.5 megawatts of electricity, what kind of community can this energy provide? When I say community, maybe enough for Hilo or Puna or -?

CHEN: Well 1.5 megawatts is the energy that we deliver now to the Hawaiian Beaches area and Pahoa. Kapoho area uses about only 1 megawatt. So we can say approximately between 1,000 to 1,500 houses.

MURAKAMI: Thank you.

CHAIRMAN: Thank you.

GRABBE: May I just add that there's sort of a general rule that it's 1 kilowatt per 1,000 people.

CHAIRMAN: Thank you. Commissioners, if you have no further questions of Mr. Skrivanek or the resource personnel, we'll ask them to just be seated in the audience and I will at this time call Mr. Jack Keppler, the Managing Director of the County of Hawaii.

I'll have to swear you in. Do you swear to tell the truth and nothing but the truth on this matter now before the Hawaii County Planning Commission?

KEPPLER: I do.

CHAIRMAN: Will you please be seated and state your name into the microphone.

(Mr. Keppler read and submitted his written testimony, copy on file.)

CHAIRMAN: Thank you, Mr. Keppler. Commissioners, do you have any questions of Mr. Keppler? Commissioner Murakami?

MURAKAMI: I have one. You mentioned because of the escalation of oil, well let's say energy, in other words, if and when the time

comes when this geothermal is implemented and success, would the rate of the electricity or whatever the energy supply is, whether it's electrical or non-electrical, would the price come cheaper than what it is now?

KEPPLER: The price of energy, as I understand it, never is going to come cheaper than what it is now, that the price of energy of \$2.50 barrel in 1971, 1972, we're never going to see again. But the question is what is the price of energy that our children are going to pay, \$32 barrel, \$52 barrel, \$152 barrel.

MURAKAMI: This is why I'm asking you the question, if the geothermal, let's assume that geothermal is successful and we can produce electricity, whether it's electrical or non-electrical products, I'm asking whether the price is going to come cheaper. In other words, I won't be here but by the time that thing would go --.

CHAIRMAN: But I think Mr. Keppler's point is well taken. I don't think it's going to be cheaper, Commissioner Murakami, but I think it is going to be a matter of whether we have energy available or not.

KEPPLER: Let me put it another way. I think that the best indication that we've got from all of these resource people is that with the development of geothermal, one, we're going to be self-sufficient. We won't have to pay money to somebody else to buy energy. Two, best indications are that the price of energy from geothermal is cost competitive in big blocks of power development now; so that if ten years from now the price of oil is doubled, our energy costs, that amount, can be derived from geothermal, is going to be less than importing oil. And I think that's our general, what we generally want to set as goals for ourselves.

MURAKAMI: Yes, but when I went to the last symposium I understood differently. They said geothermal would be just as costly.

KEPPLER: Just as costly today. The problem is that, as you know, this kind of new development takes time. Commissioner Jitchaku discussed how this project has been sitting idle all this time, one year. That idleness was waiting for the Federal Government to get it together to fund it. If we continue a slow development phase, then we won't be in a position to be cost competitive, five, ten, fifteen, twenty years from now.

CHAIRMAN: Commissioners? Mr. Keppler, thank you very much. We'll ask you to remain. This is a public hearing and there may be public testimony or questions that come as a result of the public hearing that you may want to respond to. Ladies and gentlemen of the audience, we do invite any of you at this time who wish to comment on the application before the Commission to please indicate so by raising your hand and we will invite you and welcome your testimony.

JITCHAKU: All resource people.

CHAIRMAN: Members of the staff, do you have any further questions of the applicant or any of the resource personnel who are available to us this evening?

PIIANAIA: Staff has no questions in terms of, well, we'd like to reserve any further questions if the public hearing is continued until the final EIS has been approved and comments have been received from various agencies. I'd just like to point out for the record or put it on the record that the diagrams that were referred to are not being submitted as exhibits. Just in case in the future there is any need for that clarification, that perhaps if this is approved and forwarded to the Land Use Commission for their approval, then perhaps the applicant at that time could make either these or similar exhibits available for the record for the file.

CHAIRMAN: I think your point is well taken Ilima. Yes, Mr. Skrivanek?

SKRIVANEK: One additional comment. Your staff raised the question about the injection well, whether this should be amendment number 4. I think one of our exhibits showing the plot plan shows the injection well on there. So it's a question whether this is in the written portion of the application or on the exhibits and question whether this is another amendment or whether it's adequately covered already.

CHAIRMAN: Ilima, would you care to respond to that?

PIIANAIA: I'd just like to point out that in reading through the application, it wasn't all that clear and it's a point that should be clarified just as we wanted to clarify the height and other such things.

SKRIVANEK: Yes, to be on the safe side it may be good to include it in the text in addition to the plot plan.

CHAIRMAN: I think that's advisable.

JITCHAKU: Mr. Chairman?

CHAIRMAN: Commissioner Jitchaku?

JITCHAKU: I was going to mention a follow-up of Mr. Skrivanek's point. I was just concerned that maybe it would be a matter of record or a part of the application that in case or in the future that any other part of a project within the 4.1 acres that's contained and pertaining to the project, just in case we missed something that rather than stop the project and say oh we forgot to add this into the application, that maybe we should add a section in there where anything that was missed or part of this project that's contained within this 4.1 acres be added or be considered, of course with the Planning Director's and County of Hawaii's input, and things like that. I was just concerned because of the points that staff has made so that we're very anxious and all of us here I'm sure is gratified to hear that the project will be continuing and that nothing else stops the project. I was just concerned about that that maybe we can recommend as part of the County's input that anything contained within the project or within the 4.1 acres, pertaining to this particular project, be included and considered, with, of course, the County's reviewing.

CHAIRMAN: Commissioner Jitchaku, I think your point obviously is well taken, and Ilima in her comments concerning the fact that if we deem to continue the public hearing that it will of course give us an opportunity to study the environmental impact study, and also take into consideration any further information that the applicant would like to bring to our attention or include in the application or permit.

PIIANAIA: I just like to point out, Mr. Chairman, in regards to Commissioner Jitchaku's question is that if staff would recommend approval to you, as in other applications, and I know the Land Use Commission has brought up this point too, to give an open-ended approval without really knowing what the magnitude is, anything else or say 2.3 acres or 3.3 or whatever the difference is, at that time if something else were to be planned, I think it'd be appropriate, rather, for the petitioner to come back and amend the special permit and to request something. Because if you leave it open-ended, your review powers may be limited.

CHAIRMAN: I would hope that between now and the time that we come back with the EIS that if there are any amendments at that time they would be submitted. If there is no further testimony to come up this evening, the Chair would like to entertain a motion to continue the public hearing.

JITCHAKU: Mr. Chairman.

CHAIRMAN: Commissioner Jitchaku.

JITCHAKU: I move that this Commission continues the public hearing.

CHAIRMAN: Is there a second to the motion?

PARIS: I second the motion, Mr. Chairman.

CHAIRMAN: It has been moved by Commissioner Jitchaku and seconded by Commissioner Paris that the application of the State of Hawaii Department of Planning and Economic Development for a special permit be continued. We'll take a roll call vote.

PIIANAIA: Mr. Chairman, for point of clarification, is the motion to continue the public hearing until such time as the Environmental Impact Statement is finalized and approved by the Governor?

JITCHAKU: Yes.

CHAIRMAN: I'm terribly sorry. That's the way I understood it. I should have stated it that way.

PIIANAIA: (Took roll call vote).

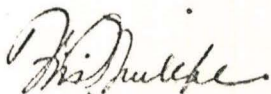
Seven ayes, the motion carries.

Public hearing adjourned at 9:00 p.m.

Respectfully submitted,

Sharon M. Nomura
Secretary

A T T E S T :



William F. Mielcke
Chairman, Planning Commission

February 24, 1978

Mr. Hideto Kono, Director
Department of Planning
and Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
Tax Map Key 1-4-01:portion of 2

The Planning Commission at its meeting of February 23, 1978 held a duly advertised public hearing on your application for a special permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District in Kapoho, Puna, Hawaii.

This is to inform you that the Commission voted to continue the public hearing until a final environmental impact statement (EIS) is approved by the Governor.

In the meantime, should you have any question regarding your request, please feel free to contact the Planning Department at 961-8288.

Sincerely,



William F. Mielcke
Chairman, Planning Commission

lgv

cc State Land Use Commission
Land Use Division, DPED

EXHIBIT II

MAR 6 - 1978



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

March 15, 1978

Mr. Sidney Fuke, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

Re: EIS, Hawaii Geothermal Research Station

Your recent letter commenting on the subject E.I.S. has been considered most carefully. The first two points raised seem to be questions of emphasis or focus in the presentation. Considering that this is a research and demonstration project, we took our responsibility to include the impact of the results intended by the project, which is to stimulate geothermal development on the Big Island. Therefore, it seemed not only appropriate but necessary to consider the effects--not only of this small installation--but of the geothermal field development which we hope will follow. That is why so much emphasis is given to possible effects on the Puna District, and not merely the immediate vicinity of HGP-A.

However, we readily agree that the larger questions should not obscure discussion of immediate impacts. Therefore, the E.I.S. is being redrafted in part to do these things:

- a. Distinguish between the R&D project (the immediate subject of the E.I.S.) and what may grow out of it (long-range impacts).
- b. Present in the main body of the Statement, instead of in the Appendix, a detailed description of the Station's facilities and the stages of construction.
- c. Emphasize more sharply the findings of environmental affects of the Station.

Replying to paragraph 3, some of these localized effects of the Station itself may be found by the reader without difficulty in the discussion--purposely highly condensed from the voluminous research reports produced by the University scientists--of the Puna District around HGP-A. On archaeological sites, the example given in paragraph 1, the draft E.I.S. says (page 23), "What few sites exist are mostly along the coast, some

EXHIBIT

JJ

Mr. Sidney Fuke
Page 2
March 15, 1978

distance from likely areas of geothermal development, which are along the rift zones inland." And "With the exception of petroglyphs at the Kapoho dome, none of the archaeological sites of Puna seem to be in the path of likely geothermal development in the District."

Here, as elsewhere, the site-specific finding of environmental factors is included in a general statement about the region. We submit that there is a value in this presentation for it informs decision-makers simultaneously about what is involved both at the site and in the broader area which may ultimately be affected.

Regarding paragraph 4, the draft E.I.S. discusses land use classifications as they relate to geothermal development, at page 58. However, it did not mention the special use permit for the project now pending, and this comment did call that omission to our attention. The final draft will note that fact and will give the State Land Use District and County zoning classifications (see page 3 of the revised E.I.S.).

Regarding paragraph 5, the substance of comments made by various agencies has been included in the draft, the comments themselves and replies placed in the appropriate part of the Report.

Regarding paragraph 6, Appendix B is the Bibliography, paged B-1, B-2, etc.

Regarding paragraph 7, the reference to the County General Plan was perhaps too narrow, in being limited to the purpose of this project (geothermal development) and not considering its means (scientific research). We will correct it in the final draft.

We trust that you will find that the revised E.I.S. has addressed your concerns. We will forward a copy to you as soon as the revised document is available.

Thank you for your reviews and comments.

Sincerely,



Hideto Kono

HK/lk
cc: Office of Environmental Quality Control

March 22, 1978

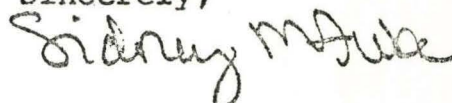
Mr. Hideto Kono, Director
Department of Planning and
Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Thank you for your letter of March 15, 1978, regarding the EIS for the Hawaii Geothermal Research Station at Puna. We look forward to receiving the revised EIS.

Please notify us as soon as the final EIS is approved so that we may continue the processing of your Special Permit application. In the meantime, if you have any questions, please do not hesitate to contact us.

Sincerely,



SIDNEY FUKU
Director

IP:mmk

cc Mr. Jack Keppeler

EXHIBIT KK

MAR 23 1978



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

March 30, 1978

Mr. Sidney M. Fuke
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Environmental Impact Statement for HGP-A Geothermal Research
Facility at Puna, Hawaii
TMK: 1-4-01: 2(por.)

Dear Mr. Fuke:

As a follow-up to our letter of March 15, 1978, we are forwarding to you one copy of the revised Environmental Impact Statement for the subject project.

For your information, the revised Environmental Impact Statement has been submitted to the Office of Environmental Quality Control for their review, in accordance with Sub-Part II, Section 1.72 Procedures for Acceptance of the EIS Regulations.

We will forward additional copies of the Environmental Impact Statement to you after it has been accepted by the Governor.

Should you have any questions regarding the Environmental Impact Statement, or require additional copies at this time, please contact our Land Use Division at 548-2061.

Sincerely,

HIDETO KONO
Director

Enclosure

EXHIBIT

LL

SP-0120

April 7, 1978

Mr. Hideto Kono, Director
Department of Planning &
Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

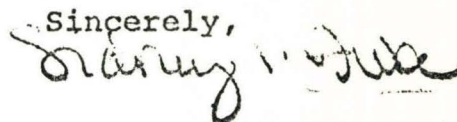
Special Permit Application
HGP-A Geothermal Research Facility - EIS

Thank you for your letter of March 30, 1978, and the copy of the revised Environmental Impact Statement for the proposed development.

As soon as the EIS has been accepted by the Governor, we shall schedule the continuation of the public hearing on this subject application.

If you have any questions, please do not hesitate to contact Ilima Piianaia or Keith Kato of this office.

Sincerely,



SIDNEY FUYE
Director

IP:mmk

EXHIBIT MM

APR 10 1978



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

April 4, 1978

Mr. Sidney M. Fuke
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Special Use Permit for HGP-A Geothermal Research Facility
at Puna, Hawaii, TMK: 1-4-01: 2(por.)

Dear Mr. Fuke:

At the public hearing before the Hawaii County Planning Commission on February 23, 1978, a question was raised as to whether or not the subject Special Use Permit should be granted for the 4.1 acre as requested in our petition, or be limited to the approximately 1.8 acres which the facility itself is expected to occupy.

At the time of the hearing, we indicated that we felt the 1.8 acres would be adequate inasmuch as no facilities were being contemplated for the remaining area. Since then however, we have re-evaluated our facility requirements, and find that the entire 4.1 acres will be required for the proposed research facility use.

As indicated by the attached conceptual drawing, we anticipate that uses such as drain fields, an aquaculture pond, visitor center and access roads will utilize the remainder of the 4.1 acres.

By this letter, we are therefore requesting that the entire 4.1 acres be approved for the proposed research facility use. We would like to stress that the attached drawing is conceptual in nature, and subject to change depending on the availability of project funds and other factors.

As stated in our March 30, 1978 letter to you, the revised Environmental Impact Statement for the project was filed with the Environmental Quality Commission last week. We anticipate that it will be accepted by Governor Ariyoshi before the end of April.

EXHIBIT NN

Mr. Fuke

-2-

April 4, 1978

If you have any questions or if we can assist you in any way, please call our Land Use Division at 548-2061.

Sincerely yours,

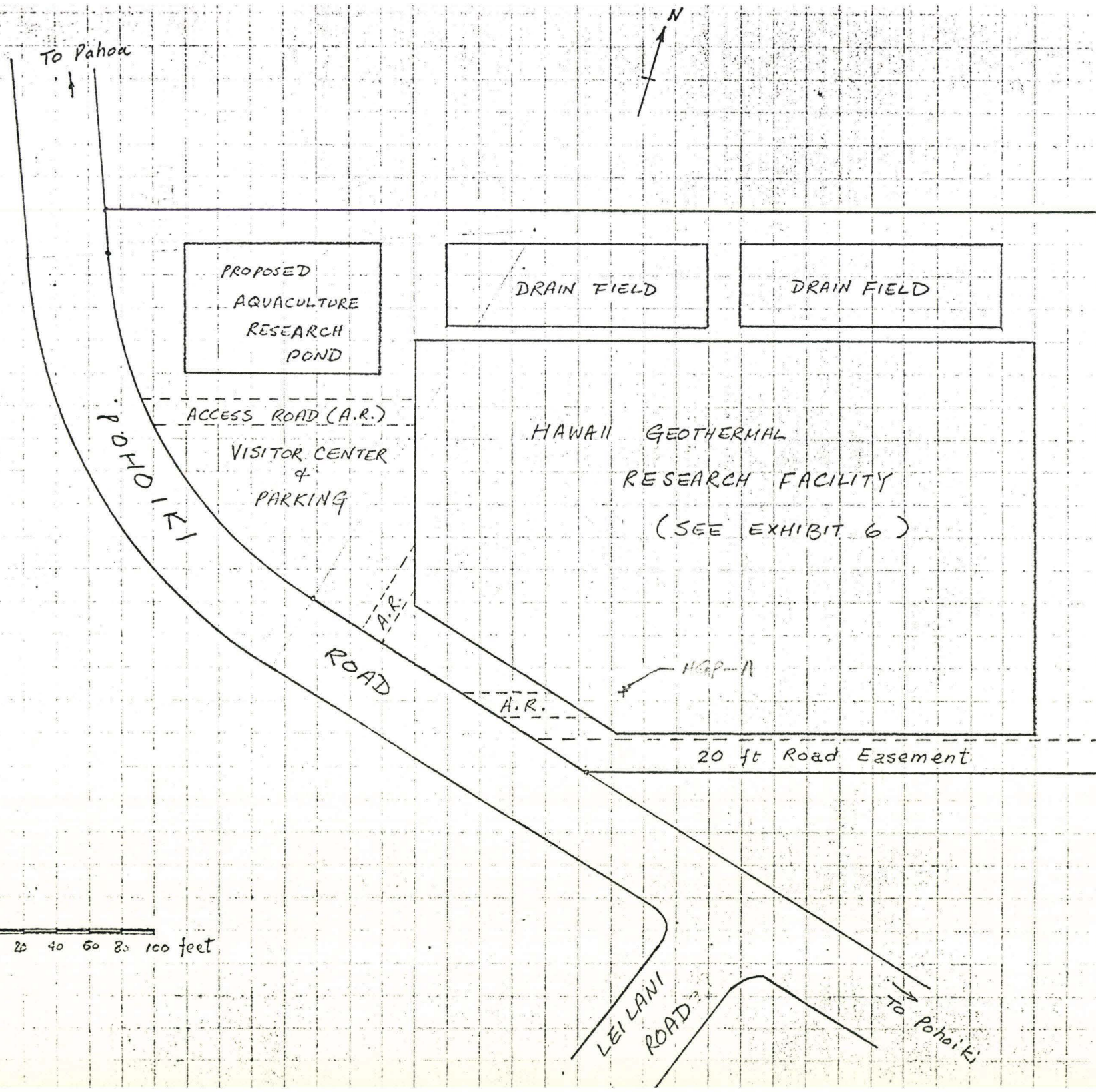


HIDETO KONO
Director

Enclosure

EXHIBIT
NN-1

0 20 40 60 80 100 feet



Proposed Use :

	<u>Approximate Area (Ac)</u>
1. Hawaii Geothermal Research Facility	1.98
2. 20' Road Easement	.15
3. Access Roads	.10
4. Visitor Center and Parking	.30
5. Drain Fields	.38
6. Aquaculture Ponds	.28
7. Unused Space for landscaping + Setbacks	.91
Total	<u>4.10</u>

April 12, 1978

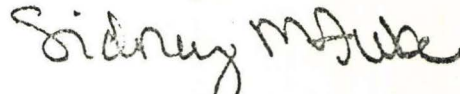
Mr. Hideto Kono, Director
Department of Planning &
Economic Development
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
HGP-A Geothermal Research Facility
TMK: 1-4-01:portion of 2

We have received your letter dated April 4, 1978, requesting that the subject application cover the entire 4.1-acre area. We appreciate the clarification of the area requirements.

Sincerely,

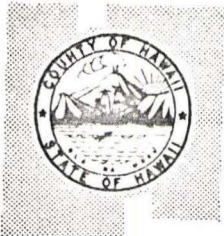


SIDNEY FUKU
Director

IP:mmk

EXHIBIT 00

APR 13 1978



COUNTY OF
HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 98720

HERBERT T. MATAYOSHI
Mayor

SIDNEY M. FUKU
Director

DUANE KANUHA
Deputy Director

April 14, 1978

Dear Property Owner: TMK:

Special Permit Application
Kapoho, Puna, Hawaii
Tax Map Key 1-4-01:portion of 2

You are hereby notified that a request for a Special Permit has been scheduled for a continuing public hearing as applied for by the petitioner, State of Hawaii Department of Planning and Economic Development. The property involved is located about one mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, Hawaii.

As previously given notice, the Special Permit request is to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4 acres of land situated within the State Land Use Agricultural District.

A continuing public hearing on the subject among others will be held beginning at 7:00 p.m. on Thursday, April 27, 1978, in the Councilroom, County Building, South Hilo, Hawaii.

You are invited to comment on the application at the hearing or submit written comments prior to the hearing.

Sincerely,

Sidney M. Fuku
Director

smn

Encl.

cc: State Land Use Commission
Land Use Division, DPED

EXHIBIT PP

APR 16 1978

APR 17 1978

April 14, 1978

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Notice of a Continuing Public Hearing
Special Permit Application
Tax Map Key 1-4-01:portion of 2

This is to inform you that your request has been scheduled for a continuing public hearing. Said hearing among others will be held beginning at 7:00 p.m. on Thursday, April 27, 1978, in the Councilroom, County Building, South Hilo, Hawaii.

The presence of a representative will be appreciated in order that all questions relative to the request may be clarified.

A copy of the hearing notice and agenda is enclosed for your information.

Sincerely,

Sidney M. Fuke

Sidney M. Fuke
Director

smn

Enclosure

cc: State Land Use Commission
Land Use Division, DPED

EXHIBIT QQ

APR 14 1978

PUBLIC HEARINGS
PLANNING COMMISSION
COUNTY OF HAWAII

NOTICE IS HEREBY GIVEN of public hearings to be held by the Planning Commission of the County of Hawaii in accordance with the provisions of Section 5-4.3 of the Charter of the County of Hawaii.

PLACE: Councilroom, County Building, South Hilo, Hawaii

DATE: Thursday, April 27, 1978

TIME: 3:30 p.m. (Item Nos. 1 to 4)
7:00 p.m. (Item Nos. 5 to 6)

The purpose of the public hearings is to afford all interested persons a reasonable opportunity to be heard on the following requests:

1. PETITIONER: R & J STEEL

LOCATION: Approximately 1,200 feet east of the main subdivision road and approximately 2.17 miles from the Pahoa-Kalapana Road in Leilani Estates, Keahialaka, Puna.

TMK: 1-3-22:53

PURPOSE: Variance to allow the creation of two (2) lots with building site average widths of 100 feet in lieu of the minimum requirement of 120 feet as stipulated within the Agricultural one-acre (A-1a) zoned district.

2. PETITIONER: WILLIAM V. BRILHANTE, INC.

LOCATION: Adjacent to the Ho'omalulu Street subdivision on the northwestern side, Waiakea Homesteads, 2nd Series, Waiakea, South Hilo.

EXHIBIT QQ

- TMK: 2-4-42:58, 59 and portion of 78
- PURPOSE: Change of zone for 5.77 acres of land from an Agricultural one-acre (A-1a) to a Single Family Residential - 10,000 square foot (RS-10) zoned district.
3. PETITIONER: WILLIAM A. LAVALLEE
- LOCATION: Along the southern side of Kawaiilani Street across from the Kawaiilani Place subdivision and adjacent to the Ahualani subdivision on the makai side, Waiakea Homesteads, 2nd Series, Waiakea, South Hilo.
- TMK: 2-4-03:36
- PURPOSE: Change of zone for 19.54 acres of land from an Agricultural three-acre (A-3a) to a Single Family Residential - 10,000 square foot (RS-10) zoned district.
4. PETITIONER: STATE OF HAWAII, HAWAII HOUSING AUTHORITY
- LOCATION: Approximately 700 feet mauka of the Ainaola Drive-Kawaiilani Street intersection and approximately 700 feet south of Ainaola Drive, Waiakea Homesteads, 1st Series, Waiakea, South Hilo.
- TMK: 2-4-19:portion of 27
- PURPOSE: Change of zone for 4.31 acres of land from an Open (O) to a Single Family Residential - 15,000 square foot (RS-15) zoned district.

5. PETITIONER: THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, HILO HAWAII STAKE
- LOCATION: Southern corner of the intersection of the Kea'au-Pahoa Road and Orchid Land Drive in Orchid Land Estates, Kea'au, Puna.
- TMK: 1-6-09:388, 389 and 390
- PURPOSE: Special Permit to allow the establishment of a church on three (3) acres of land situated within the State Land Use Agricultural District.
6. PETITIONER: STATE OF HAWAII DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
- LOCATION: About one mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna.
- TMK: 1-4-01:portion of 2
- PURPOSE: Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests on approximately 4 acres of land situated within the State Land Use Agricultural District.

Maps showing the general locations and boundaries of the areas under consideration and/or plans of the proposed developments are on file in the office of the Planning Department in the County Building at 25 Aupuni Street, Hilo, Hawaii, and are open to inspection during office hours. All comments should be filed with the Planning Commission before that date, or in person at the public hearing.

PLANNING COMMISSION,
WILLIAM F. MIELCKE, Chairman
By SIDNEY M. FUKU
Planning Director

(Hawaii Tribune-Herald: April 17 and 25, 1978)



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

April 14, 1978

Mr. Sidney M. Fuke
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Special Use Permit for HGP-A Geothermal Research Facility
at Puna, Hawaii, TMK: 1-4-01:2(por.)

Dear Mr. Fuke:

As a follow-up to our April 4, 1978 letter, we are pleased to inform you that the Environmental Impact Statement for the subject project was accepted by Governor Ariyoshi on April 12, 1978.

We are enclosing for your information and use, a copy of the Governor's acceptance letter, and three copies of the accepted statement.

With the acceptance of the EIS, we understand that the hearing on the subject permit can now be continued. We would appreciate being notified as soon as a hearing date has been scheduled.

Thank you for your cooperation in this matter.

Sincerely yours,



HIDETO KONO
Director

Enclosures

EXHIBIT RR



EXECUTIVE CHAMBERS
HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

April 12, 1978



MEMORANDUM

TO: Honorable Hideto Kono, Director
Department of Planning and Economic Development

SUBJECT: Environmental Impact Statement for Hawaii Geothermal Research
Station Utilizing the HGP-A Well at Puna, Island of Hawaii

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes, and the Executive Order of August 23, 1971. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

When you make your decision regarding the proposed action itself, I hope you will weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, will provide you with a useful analysis of alternatives to the proposed action.


George R. Ariyoshi

cc: Mr. Richard O'Connell
Environmental Quality Commission

EXHIBIT RR-1

April 20, 1978

Mr. Hideto Kono, Director
Dept. of Planning & Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
Geothermal Research Facility
TR: 1-4-01: portion of 2

Thank you for your letter of April 14, 1978, informing us of the Governor's acceptance of the Environmental Impact Statement for the subject project.

The public hearing on the Special Permit Application will be continued on Thursday, April 27, 1978 at 7:00 p.m. in the Councilroom of the County Building, Hilo.

Sincerely,

Sidney Fure

SIDNEY FURE
Director

IP:ak

EXHIBIT SS

APR 21 1978

PLANNING COMMISSION

Planning Department
County of Hawaii

MINUTES
April 27, 1978

The Planning Commission met in regular session at 2:00 p.m. in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke presiding.

PRESENT:	William F. Mielcke	ABSENT:	J. Walsh Hanley
	William J. Paris, Jr.		Shigeru Fujimoto
	Haruo Murakami		Lorraine R. Jitchaku
	Bert H. Nakano		
	Alfredo Orita		Ex-officio Member
	Charles H. Sakamoto		Akira Fujimoto

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Keith Kato, Planner

Edmund Morimoto, representing Ex-officio Member Edward Harada
Lionel Meyer, Deputy Corporation Counsel

and about 4 people in attendance at 10:00 a.m., 12 people at 3:30 p.m., and 14 people at 7:00 p.m.

MINUTES: It was moved by Commissioner Orita and seconded by Commissioner Sakamoto that the minutes of April 13, 1978, be approved as circulated. Motion was carried.

All those testifying were duly sworn in.

Upon Mr. Kazuo Nakamura's request, it was moved by Commissioner Sakamoto and seconded by Commissioner Orita that the agenda be amended to reschedule Item 3 under New Business to Item 6 under Public Hearings and Items 6 and 7 renumbered Items 7 and 8 respectively; motion was carried.

VARIANCE	Request by Darryl M. Freeman, Sr. for an
PERMIT NO. 474	extension of time of Condition 1 of Variance
DARRYL M.	Permit No. 474 which stipulated that final
FREEMAN, SR.	approval be secured for a proposed 3-lot
WAIAKEA HOMESTEADS,	subdivision within one year of the effective
2ND SERIES, SOUTH	date of the Variance Permit. The subject
HILO	area is off of Ainaola Drive, approximately
	500 feet makai of the Ainaola Drive-Kupulau
	Street intersection across from Ala Oli Street, Waiakea Homesteads,
	2nd Series, South Hilo, TMK: 2-4-32:15 & 16, 2-4-33:28.

Staff presented background information and recommendation for approval with conditions on file.

Mr. Cooper said that they have to be assured that the County will not be typing up good lands for parks. He said although the area is not zoned as a commercial fishing area, he felt the zonings would have to be changed.

It was moved by Commissioner Sakamoto and seconded by Commissioner Paris that the public hearing be closed; motion was carried.

It was moved by Commissioner Sakamoto and seconded by Commissioner Murakami that the SMA Use Permit be approved with the conditions outlined by the staff. A roll call vote was taken and motion carried with six ayes.

SPECIAL PERMIT
STATE OF HAWAII
DEPARTMENT OF
PLANNING AND
ECONOMIC
DEVELOPMENT
KAPOHO, PUNA

Continuation of a public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4.0 acres of land located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2.

Staff presented background information on file.

For clarification, the Chair pointed out that the request is for the approval of the entire 4.1 acres.

The petitioner's representatives, John P. Keppler, Bill Chen, and Esther Ueda were present.

Mrs. Ueda pointed out that they were informed by the Office of Environmental Control that their revised conceptual plan is a nonsignificant change; and therefore the mere filing of the plan was sufficient.

Under public testimony, Mr. James Stilts, Chairman of Leilani Community Association on Geothermal, questioned the effects and benefits they would derive from this geothermal project. He pointed out that if the wind is blowing just right, they are able to smell the sulphur. Dr. Bill Chen pointed out that the project is committed to reduce the noise and smell level as much as the present technology is able to. Dr. Chen pointed out the reasons for this research demonstration is to find out whether it is worth the environmental degradation and also to find out other non-electric uses that could be utilized.

Mr. Stilts added that in Iceland an average home used between \$80 to \$90 a month for electricity and now with geothermal it is reduced to \$20. He said he could not see why this could not be done here. Chairman Mielcke pointed out that although the Commission is concerned with the cost of electricity, the question before the Commission is whether the Special Permit should be acted favorably upon.

Under public testimony, Mr. James Kahaloa, on behalf of the Puna Hui Ohana, recommended that the special permit be denied. He pointed out that the Puna Hui Ohana felt that the environmental impact statement failed to properly recognize and take into consideration the

impact of the proposed project on the aboriginal rights of the native Hawaiian people. The Chair reiterated his previous statement that the Commission is going to direct its decision on whether to recommend favorable approval of the special permit, and pointed out that the Commission is not in a position to make any kind of ruling on aboriginal rights.

Mr. Stephen Kane-a-I Morse, also under public testimony, Director of the Native Hawaiian Legal Corporation, spoke against approval of the special permit request and said that the energy which the project proposes to tap and sell is a physical manifestation of the Hawaiian religion. He said he felt it would be a mistake to allow this special permit to go through as there were very serious questions unanswered concerning the impact it has on the aboriginal Hawaiian people and their culture.

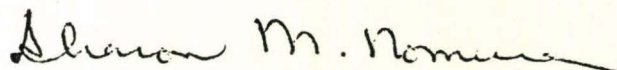
Mr. Genesis Namakaokalani Lee Loy echoed the sentiments and thoughts of Mr. Kahaloa and Mr. Morse.

Under public testimony, Mr. Alika Cooper requested the matter be deferred until the Hawaiian aboriginal rights, the Hawaiian Gods, and the Hawaiian culture, are considered. In response to Mr. Cooper's comments that Hawaiians are not represented in State or County Governments and boards and commissions, Commissioner Paris pointed out that the Planning Commission is represented by a Hawaiian as he himself is of Hawaiian blood.

It was moved by Commissioner Murakami and seconded by Commissioner Orita that the public hearing be closed; motion was carried.

ANNOUNCEMENTS: Next scheduled meetings are as follows: May 17th in Kona; May 18th in Kona, Waimea, and Honokaa; and June 1st in Hilo.

Respectfully submitted,



Sharon M. Nomura
Secretary

A T T E S T:



William F. Mielcke
Chairman, Planning Commission

LUC

PLANNING COMMISSION

Planning Department
County of Hawaii

HEARING TRANSCRIPT
April 27, 1978

A regularly advertised public hearing, on the application of the State of Hawaii Department of Planning and Economic Development, was called to order at 7:57 p.m., in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke presiding.

PRESENT:	William F. Mielcke	ABSENT:	J. Walsh Hanley
	William J. Paris, Jr.		Shigeru Fujimoto
	Haruo Murakami		Lorraine R. Jitchaku
	Bert H. Nakano		
	Alfredo Orita		Ex-officio Member
	Charles H. Sakamoto		Akira Fujimoto

Duane Kanuha, Deputy Planning Director
Norman Hayashi, Planner
Keith Kato, Planner

Edmund Morimoto, representing Ex-officio Member Edward Harada
Lionel Meyer, Deputy Corporation Counsel

and about 15 people in attendance

CHAIRMAN: We will proceed with the next item on the agenda. The continuation of a public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4.0 acres of land located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2. Staff?

HAYASHI: (Presented background information on file.)

CHAIRMAN: Thank you, Mr. Hayashi. Members of the Commission, we had that benefit of the previous public hearing of accepting testimony from Mr. Jack Keppler, and also from Mr. Hideto Kono, and before us tonight is just one addition for clarification, request of the entire 4.1 acres be approved for the proposed facility. Do you have any questions at this time of the staff?

If there are no questions of the staff, is there a representative of the applicant or the applicant present? Yes, I'd like to at this time swear you all in. If you'll raise your right hands please. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

Exhibit UU

KEPPLER: I do.

CHEN: I do.

UEDA: I do.

CHAIRMAN: Would you please be seated and if we can start, Jack, with yourself and go down and have everyone introduce themselves for the record.

KEPPLER: My name is John P. Keppler, Managing Director of the County of Hawaii, representative of the County of Hawaii on the Hawaii Geothermal Development and HGP-A project.

CHEN: My name is Bill Chen. I am the acting project manager for the Hawaii geothermal project wellhead generator program, and I'm also the geothermal energy program manager for the Department of Planning and Economic Development.

UEDA: My name is Esther Ueda and I'm with the Land Use Division of the Department of Planning and Economic Development.

CHAIRMAN: Thank you very much. You've heard the staff's background report and their statement of the change that you've proposed since our last hearing. Do you have anything else that you would like to add at this time?

CHEN: No, we don't.

CHAIRMAN: Okay, yes, Ms. Ueda.

UEDA: I wonder if I could add one thing?

CHAIRMAN: Surely.

UEDA: For your information, we did discuss the revised conceptual plan with the Office of Environmental Quality Control, and they informed us that this is a nonsignificant change and therefore a mere filing of the plan with them would be sufficient. We have done so.

CHAIRMAN: Thank you. Okay, I might ask you to please be seated up here on the front row. This is a public hearing and the Commission will be accepting testimony and we may ask you to respond to some of the questions.

Ladies and gentlemen in the audience, this is a continuation of a public hearing on the application of the State of Hawaii Department of Planning and Economic Development for a special permit. Before I ask for testimony from the audience, I want to review the special permit criteria, and the Planning Director's role and the Planning Commission's role. The purpose of the special permit is to use land within the State Land Use Agricultural Rural Districts for other than uses permitted within these districts. The Planning Director's role is to review and make recommendations to the Planning Commission. The Planning Commission's role is advisory.

If recommending approval, adjudicatory, if recommending denial. It is our responsibility to conduct a public hearing after 30 days but within 120 days from the receipt of the petition. This will allow the Commission the opportunity to receive information from the staff and the petitioner; and public testimony will be taken. No testimony rebuttle allowed after the public hearing is closed. Voting, at this point, would be a motion to continue the public hearing or a motion to close the public hearing. No action on special permits is taken until after the public hearing is closed and a 15-day waiting period has been concluded.

I would also like to review for you from the State Land Use Commission's Rules of Practice and Procedure in District Regulations, Part V, Special Permits. Petition before the County Planning Commission - Any person who desires to use his land within the Agricultural Rural District for any use other than agricultural or rural use may petition the County Planning Commission in which the land is located for permission to use his land in the manner desired. Test to be applied - certain "unusual and reasonable" uses within the agricultural or rural districts other than those for which the district is classified may be permitted. The following guidelines are established in determining "unusual and reasonable uses" (1) such use shall not be contrary to the objectives sought to be accomplished by the State Land Use Laws and Regulations, (2) that the desired use would not adversely affect the surrounding property, (3) such use would not unreasonably burden the public agencies to provide roads, streets, sewers, water, drainage and school improvements, and police and fire protection, (4) that unusual conditions, trends, and needs have arisen since the district boundaries and regulations were established and (5) that the land upon which the proposed use is sought is situated for the uses permitted within the district.

So we will be accepting testimony from the public on the special permit application. I'd like to ask that you speak to the application and to the test to be applied for the granting of the special permits. At this time, I would like to invite anyone from the public who would like to speak for or against this application.

STILLS: Mr. Chairman?

CHAIRMAN: Yes, sir, gentleman in the front. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

STILTS: I do.

CHAIRMAN: Please be seated and if you would identify yourself into the microphone.

STILTS: I'm James Stilts, Mr. Chairman, and I am Chairman of the Leilani Community Association on geothermal. And we are concerned on this thing inasmuch as the Leilani Estates, it doesn't show on your map here, but if you will notice Leilani Estates comes this way to your map there. We have 2,460 acres in there, and it's a potential of a pretty good size population some time later. Now, I want to make it clear that we're not against geothermal in no way whatsoever, other than we want to know how it's

going to affect us and what benefits we're going to get from it. Now, we take the position there that this things that's been such a big question, where everyone have fee simple title to this land there, and that means to us that we own the mineral and everything underneath us and we do take that position. Now, there is this, now I live on Moku Street which is two miles, almost two miles from this particular well in question there, and when they've been testing it, why I can't smell it at my house; but if I'm asleep, it will actually shake my house when, of course, we realize that when they get to using it, it's not going to be like it would be on the test.

But then I took a trip one particular day down to the well when they were testing it to see how far I could smell the sulphur, and I could smell the sulphur at Makema Street which is just about a mile from the well. And when the wind is just right now, you can get up close to the well when they're testing it and you can't even smell it, but if the wind is just right, it will bring that sulphur smell, I believe, most of Leilani Estates there.

Now we have made a small survey and what we would like to know to is how this geothermal energy, if it's going to be used for electricity or what. Now, we read where in Iceland, which is a big country, that's affected the whole entire island there, is using geothermal energy for just about everything. They heat their homes with it, and they grow bananas on the ice, tomatoes, and everything else. And we're just wondering if this thing is going to be just used for electricity or is everybody going to have some benefit from it, and we want to know just what is going on.

CHAIRMAN: Okay, Mr. Stilts, Dr. Chen, at our last meeting, did address himself to those very questions; and I will ask him to briefly respond to you today concerning the questions that you have raised in terms of effects, benefits, noise and smell, and what's happening in Iceland and what could potentially happen here on the Big Island.

STILTS: Thank you, sir.

CHAIRMAN: Are you ready for that, Dr. Chen?

CHEN: The project is committed to reduce the noise and the smell level as much as the present technology is possible to do it. If the technology tells us that we would not be able to scrub out all the way to the point that it's reasonable, I think we have to really take a serious look at it and see whether it's worth the environmental degradation for us to use it; but we don't know. And that's the reason for this research demonstration project. Certainly, all kinds of other non-electric uses that can be utilized, but it needs to be demonstrated, and that's why we proposed this research facility. And I won't be here and doing this work if I did not believe that it will benefit all of us.

CHAIRMAN: Okay, as I recall, your testimony at our previous public hearing, you said that you've really given considerable thought to the sound baffles and particularly the scrubbers and that there have been major modifications since the initial drilling.

CHEN: It will be, yes. The technology of a hydrogen sulfide scrubbing system or the sulphur scrubbing system is growing at leaps and bounds so that we do not want to identify specific processes at this moment, because maybe two months later we'll have a better system, and we want to utilize the best possible technology that's available at that time.

CHAIRMAN: Thank you. Mr. Stilts, does that answer your question generally?

STILTS: Generally. There's one other thing that I do want to bring up.

CHAIRMAN: Please come forward.

STILTS: Thank you. Now we read where in the case of electricity, well say for instance that it's going to be used, that there would be no reduction in rates. Now this report that we have from Iceland, they were using oil there to heat, and oil to cook and just about everything with oil prior to the latest eruption that they've had there, and now they are just practically using the steam for the whole island. And oil was costing for the average home between \$80 and \$90 a month. And when they started using the geothermal energy there, it was reduced to \$20 per month. There's one big difference; and I can't see why that, if Iceland can do that on the iceberg up there why we can't have some reductions here.

CHAIRMAN: Okay. Mr. Stilts, let me just say to you that the Commission, of course, is interested in what the cost of electricity is going to be. But we're really going to address ourselves to the question which is before the Commission, and that is, whether the special permit ought to be favorably acted upon; and the cost of electricity is not something that the Commission is really going to concern itself with tonight. We share that concern as private citizens here, but that's not really the question before us tonight.

STILTS: Okay, I see.

CHAIRMAN: The Chair will, at this time, ask anyone else in the audience who would like to testify before the Commission concerning this application. Yes, sir, if you'll come forward. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

KAHALOA: Yes.

CHAIRMAN: Would you please be seated and state your name into the microphone.

KAHALOA: Good evening, gentlemen. My name is James Kahaloa and I am a resident of Opihikao, Puna. I am here to testify in behalf of the Puna Hui Ohana, a non-profit organization which was formed by native Hawaiian residents of the lower Puna area. The Puna Hui Ohana was created as a result of a growing awareness among the native Hawaiians of lower Puna that an organized effort was needed to overcome the many barriers which prevented us from

achieving a level of self-sufficiency once enjoyed by our ancestors. The primary objectives of the Puna Hui Ohana are (1) to create and provide opportunities which enhance the self-sufficiency of the native Hawaii people of lower Puna and (2) to preserve and perpetuate our traditional Hawaiian culture, aboriginal rights, and lifestyle.

We have reviewed the environmental impact statement prepared for the proposed project which is the subject of this public hearing. Based on our review of the EIS, the Puna Hui Ohana recommends that the Department of Planning and Economic Development's request for a special use permit to establish a permanent geothermal facility at Pohoiki, Puna, be denied.

Our recommendation is based on the fact that the EIS fails to properly recognize and take into consideration the impact of the proposed project on the aboriginal rights of the native Hawaiian people. It is our feeling that the project, as proposed, will have a tremendous negative impact on our aboriginal rights.

The EIS fails to recognize that native Hawaiians have aboriginal rights to use natural resources such as geothermal energy. These rights are supported by the following historical facts:

1. Our ancestors enjoyed prior use of this precious resource. Steam was used for cooking and warming of food wrapped in Ti leaves, and so forth.
2. Up until the forceful overthrow of Queen Liliuokalani in 1893, mineral rights within the Hawaiian Islands were reserved to the sovereign Hawaiian nation. Because the overthrow was supported by armed forces of the United States Government, it constituted an illegal act. As a result, native Hawaiians are now seeking restoration of land, sovereignty, and native rights, including mineral rights, from the federal government.

The EIS, however, ignores these facts and falsely assumes that the State in developing the geothermal facility has the right to sell the energy that is produced. For instance, on page 4, the EIS states, "Up to three megawatts of the electricity generated, surplus to the needs of the geothermal station, will be purchased by the Hawaii Electric Light Company (HELCO)."

It goes on to say on page 49 that the State would derive economic benefits from geothermal development by receiving royalties from geothermal deposits which it has reserved.

We believe these kinds of assumptions illustrate the State's complete disregard of and insensitivity to our aboriginal rights, and we are prepared to challenge what we feel is the State's encroachment upon these rights.

We realize that if this special use permit request is denied it may set back the development of geothermal energy in Hawaii. However,

we feel, and we ask you to understand, that in our struggle to perpetuate our race and culture in this complex technological society, we cannot allow our aboriginal rights to go unrecognized.

Mahalo.

CHAIRMAN: Thank you, Mr. Kahaloa. We appreciate very much your testimony this evening. Again, as I mentioned to Mr. Stilts, the Commission is going to direct its decision this evening on the question that is before it concerning the special permit; and we on the Planning Commission are not in a position to make any kind of ruling on aboriginal rights whatsoever. It's not in our jurisdiction.

The Chair, at this time, would like to invite anyone else from the audience who would like to present testimony. Yes. Do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

MORSE: I do.

CHAIRMAN: Please be seated and state your name into the microphone.

MORSE: My name is Stephen Kane-a-I Morse. I'm a resident of Malama Ki, Puna, which is less than a mile from the proposed geothermal facility. I am here to speak as a director of the Native Hawaiian Legal Corporation, formerly know as the Hawaiian Coalition of Native Claims. The Native Hawaiian Legal Corporation is a non-profit tax exempt corporation which was created in 1974 for the purpose of providing legal research and documentation of native Hawaiian rights as a means of educating the general public as to the existence of these rights and the need to properly safeguard these rights for future generations of native Hawaiians.

I'm here tonight basically to speak against the approval of the special use permit for a number of reasons, some of which Mr. Kahaloa has already outlined, but I would like to add to his comments that one of the native rights that we have documented for native Hawaiians is the right to practice their traditional religion, and that energy which is the project proposes to tap and sell is a physical manifestation of that religion. Our kupuna, our elders, refer to that energy as Pele, the legendary fire-goddess. One of our kupuna, an elderly Hawaiian woman of Ka'u who prefers to remain anonymous, provided us with her mana'o, her thoughts, on this matter, and I would like to take the time to quote some of these remarks from her.

"Aloha! Please lend me your ears in a story that was told to me, a story of love and yet a sadness. Energy, that is something I do not understand. To me energy is Pele. Pele is the giver and also a taker, to ask me who has the right to her? I cannot answer that, for she was here before life itself. I was taught to honor her in everything and never to do wrong on her grounds.

We were aware of the goodness she offered to us, we accepted and appreciated what we had and left it in

its natural form for others to enjoy when they needed to. When a natural form is mistreated or misused, that sacredness of that natural form and all that exist within its boundaries will be destroyed. Remember warm springs and the beauty this natural pond had? The ponds were naturally sectioned separately for children and adults. In the center of the pond was an island, under water a secret cave, Hawaiian herbs surrounding the area. This natural beauty turned into a tourist trap with a 10 cents, 25 cents, then \$1.25 charge. This you remember was destroyed by lava.

The energy Pele explodes belongs to her and is her. To fight over the right of her or who should have control is not for me to say for I am a Hawaiian. Who am I to say? Who would listen to me? I've been told it is wrong to believe energy is Pele. I have also been told this energy could be put to good use for our people and others on the island. But to me Pele is the last of our Gods. I for one will not fight over her or try to get ownership of her. She belongs to us in our own sacred ways.

I'm here to say tonight, gentlemen, that by drilling and selling this energy to us is nothing short of sacrilegious, at least to those of us who still believe in the traditional Hawaiian religion. We would no more sell Tutu Pele than you would sell your Jesus Christ, your Buddah, or whatever spiritual power that you place your utmost faith and belief in.

The proposed project, I contend, would interfere with our right to religious freedom. A freedom which I may remind you is even guaranteed by the United States Constitution and more recently by a Congressional Senate Resolution introduced by Senator James Abourezk of South Dakota and Senator Spark Matsunaga which sets forth a clear policy of religious freedom for traditional American Indians, Native Alaskans and Native Hawaiians. I'd like to quote also from some of the Congressional Record pertaining to that resolution;

"One of the most fundamental precepts in the founding of our country is the freedom of religion Indians have an inherent right to the free exercise of their religion. That right is reaffirmed by the U. S. Constitution in the Bill of Rights as well as by many State and tribal constitutions. The practice of traditional native Indian religions, outside the Judeo-Christian mainstream or in combination with it, is further upheld in the 1968 Indian Civil Rights Act.

However, in recent years, there have been increasing incidents of abrogation of the religious rights of American Indians. New barriers have been raised against the pursuit of their traditional culture, of which religion is an integral part.

It is clear that these incidents did not result from a Government policy to abridge the religious freedom of Indians. Rather, events were allowed to occur, because there was a lack of Government policy."

So I'm here tonight, gentlemen, to just say that I think it's a mistake at this point to go ahead and allow this special permit to go through, mainly because there's very serious questions concerning the impact it has on aboriginal Hawaiian people and their culture and I just hope that you folks understand that it's very important to us that our desires and our culture be given the utmost consideration in your decision. Mahalo.

CHAIRMAN: Thank you, Mr. Morse. Anyone else from the audience who would like to testify before the Commission this evening? Do swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

LEE LOY: My name is Genesis Namakaokalani Lee Loy. My statement tonight will be a short one. I'd like to say for the head of the household of 14, I speak for these members also, I am a native Hawaiian and I echo the sentiments and thoughts of the previous two speakers that spoke about Hawaiian aboriginal rights and Hawaiian rights, our native rights. Thank you.

CHAIRMAN: Thank you. Anyone else from the audience who would like to testify? Yes, Mr. Cooper. Mr. Cooper, do you swear to tell the truth and nothing but the truth on this application now before the Hawaii County Planning Commission?

COOPER: I do. May I speak from there?

CHAIRMAN: You certainly may.

COOPER: First of all, is this the EIS? Is this is the public hearing on this EIS?

CHAIRMAN: No, it is not.

COOPER: You know, I'm really concerned about this geothermal energy. It's amazing this question is coming up to you. Ever since this thing came to, there have been many people, especially Hawaiians who are concerned about this. And I stand here tonight and I look at the makeup of your Board here, and I feel, you know, a little bit what we call hilahila. I want to tell you about the history, because it's obvious that none of you gentlemen here know anything about the history. But our nation was overthrown in 1893 by a handful of haoles, transient, mainland type people. It was overthrown because there was a warship in the harbor and it was overthrown by force. Until this day, we have never had a settlement with the United States.

Now I want to tell you a little bit about what happened. When Captain Cook discovered these islands, there were about 550,000 Hawaiians here. A hundred years later, the Hawaiians are down to 47,000. But still, they were about 96 percent of the population. Twenty-two years later, the Hawaiians were down to 27,000 people, less than 18 percent of the population. The government was overthrown, the couldn't even vote, by force. Today, where are the Hawaiians? They're sure not in the State government, the County government, they're not too many that sit on your boards. It's a very sad situation. The Hawaiians stuck at jails, unemployment, drop-outs, they're not in your hotel industry except as servants. They're not in the County, they're not in the State Government, they're not in the Federal Government.

And here, this is a very important matter. You see, you're talking about our aborigine rights. Geothermal was used by our people far before any of you people came here. It was used for heat, it was used for cooking, it was used for medicine, but it was mostly used because of the religion. Now many people still believe in Pele and still worship Pele, and I don't really think that you have a right to go down into these lands and give, you know, your Board, give permission on a special permit so that they can take these rights.

I believe legally the question has never been answered. The State has, as you know, rules and regulations on geothermal, but I don't think the State owns this. This is owned by the Hawaiian people, by the Hawaiian Nation. And I feel, gentlemen, that there has been a lot of precedence set. The Alaskans, for instance, got all their natural resources including water, oil, everything that comes up, gold, silver. The Indians own all their natural resources. And now the Hawaiians who also are native Americans has none of these rights? I feel, gentlemen, that it's nice to sit on the Board and make all kinds of decisions, but I think that this is a very important decision that you have to make; and I feel it's not a right decision to make until the State can work out with the Hawaiian people what share of this geothermal heat will be theirs. But most of importance, because of the religious factors, I believe you have no right to tamper with this thing.

I'm very upset, and all this time that this geothermal stuff has been going on, the University has never kept up with us, Dr. Shupe, your Department of Economic Development, nobody has kept us posted. We've talked to them, we've asked them, we've asked the County, we've asked Garcia over here in this County, never ever keep us posted on what's happening. And I want to tell you that it's a very important decision. And I ask that you defer this until the Hawaiians are considered, their aborigine rights, their Gods, and their culture. Do you have any questions? No questions?

CHAIRMAN: Commissioners, do you have any questions of Mr. Cooper?

PARIS: I have one, no question of Mr. Cooper, but I'd like to state that I think I'm as much as, I'm as good a Hawaiian representative as anybody. You refer that I have no representation on this Board. My great, great grandmother was Princess Kipikane from the Court of King Kamehameha the first.

COOPER: I know that.

PARIS: And my great, great, great grandfather was the Chief of the lands of Manuka to Kapua and South Kona. So I do have Hawaiian blood in my veins and I'm conscious.

COOPER: Thank you, Mr. Paris. I hope that the rest of you on this Board will be very conscious because this is a very important issue. Geothermal is a very, very important issue. Thank you.

CHAIRMAN: Thank you, Mr. Cooper. I also would like to acknowledge Mr. Kanuha who is Hawaiian.

The Commission's, again, role in this question is not to make a decision about aboriginal rights, is to make a decision as to whether to send a favorable recommendation to the State Land Use Commission concerning special permit, and I don't want to lose sight of just what the application is before us this evening.

I will, at this time, welcome anyone else who would like to speak either for or against this application. If there is no further testimony to come before the Commission, the Chair will entertain a motion to close the public hearing.

MURAKAMI: Mr. Chairman?

CHAIRMAN: Commissioner Murakami.

MURAKAMI: I move that the public hearing be closed.

CHAIRMAN: Is there a second to the motion?

ORITA: Mr. Chairman, I second the motion.

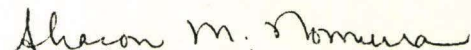
CHAIRMAN: It has been moved by Commissioner Murakami, seconded by Commissioner Orita that the public hearing be closed. All those in favor so signify by saying aye?

COMMISSIONERS: Aye.

CHAIRMAN: Oppose, same sign? The public hearing is closed. Action on this application for a special permit cannot be taken until the completion of a 15-day waiting period after the conclusion of the public hearing. The action that will be taken at that time will be a motion to defer, a motion to deny, or a motion to send a favorable recommendation to the State Land Use Commission.

Public hearing adjourned at 8:36 p.m.

Respectfully submitted,



Sharon M. Nomura
Secretary

A T T E S T:



William F. Mielcke
Chairman, Planning Commission

April 28, 1978

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

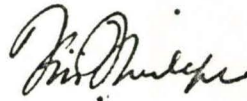
Special Permit Application
Tax Map Key 1-4-01:portion of 2

The Planning Commission at its meeting of April 27, 1978, held a continued public hearing on your application for a special permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District at Kapoho, Puna, Hawaii.

In accordance with the provisions of Section 205-6, Hawaii Revised Statutes, the Commission shall act on such petition not earlier than fifteen (15) days after the said public hearing.

We shall notify you when the Commission is ready to take action on your request.

Sincerely,



William F. Mielcke
Chairman, Planning Commission

lgv

cc State Land Use Commission
Land Use Division, DPED

EXHIBIT

VV

APR 30 1978

May 18, 1978

Mr. Hideto Kono, Director
State of Hawaii
Department of Planning and
Economic Development
P. O. Box 2359
Honolulu, HI 96804

Dear Mr. Kono:

Special Permit Application
Tax Map Key 1-4-01:Por. of 2

Your application will again be discussed on Thursday,
June 1, 1978, by the Planning Commission. The meeting will
be held in the Councilroom, County Building, South Hilo, Hawaii,
and is scheduled to begin at 1:00 p.m.

You will be notified of the Commission's decision.

A copy of the agenda is enclosed for your information.

Sincerely,

Sidney M. Fuke
Sidney M. Fuke
Director

smn

Enclosure

cc: State Land Use Commission
Land Use Division, DPED

EXHIBIT WW

MAY 19 1978

GEORGE R. ARIYOSHI
Governor



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES
Hawaii District Office
P.O. Box 4127
Hilo, Hawaii 96720

May 19, 1978

LETTER NO. _____

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

DIVISIONS:
Accounting
Archives
Audit
Automotive
Central Services
Computer Center
Public Works
Purchasing
Survey

Hawaii Geothermal Research Stn.
Being a portion of L.P. 8177
and R.P. 4497 L.C. Aw. 8559
Apana 5 to C. Kanaina
(Certificate of Bdy. No. 124)
TMK: 1-4-01:2

Mr. Sidney M. Fuke, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Fuke:

This is to apprise you that we have completed the boundary stakeout for the above subject matter on May 12, 1978, pursuant to Section 9-H of the Subdivision Ordinance No. 62, County of Hawaii.

A copy is attached herewith.

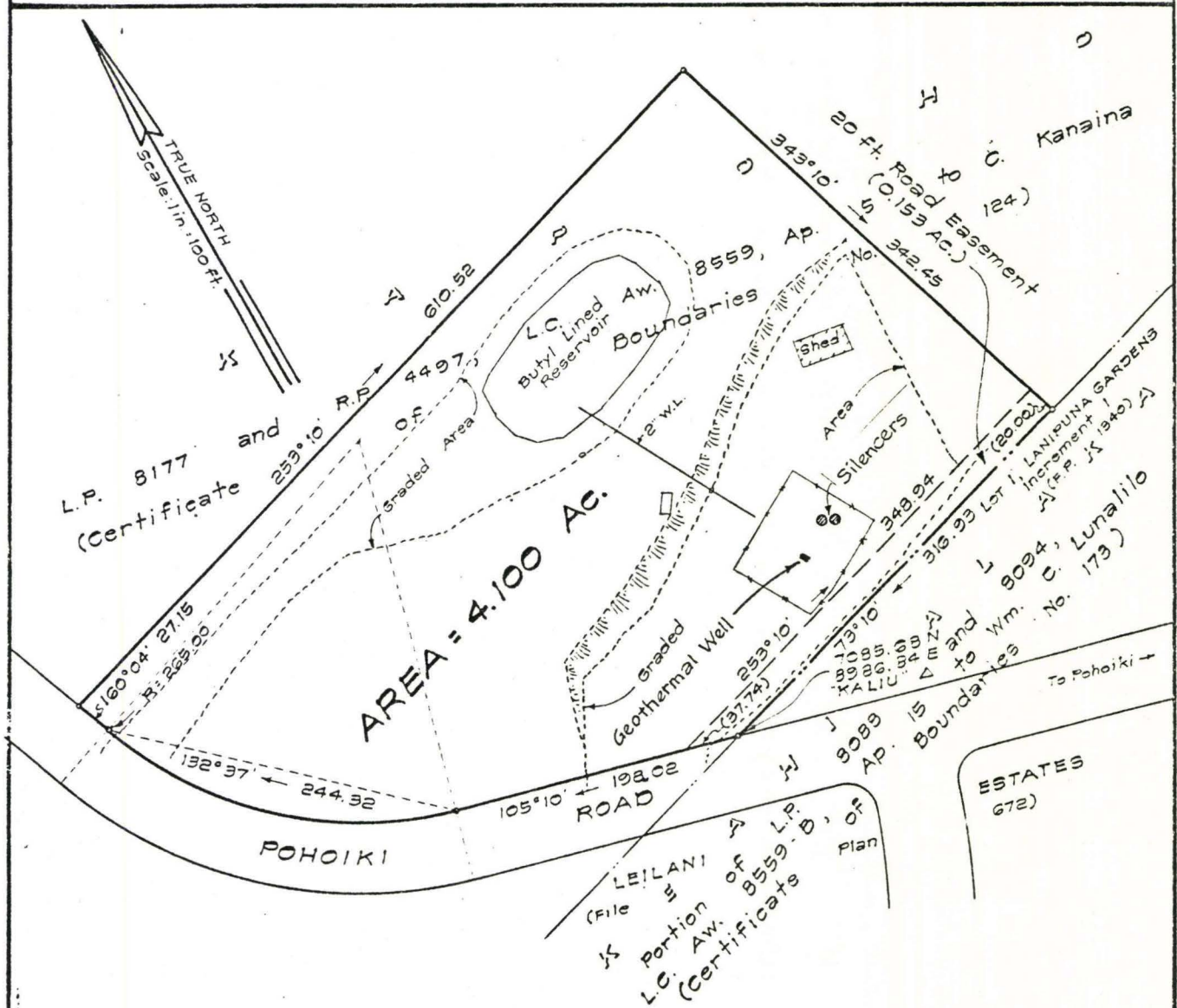
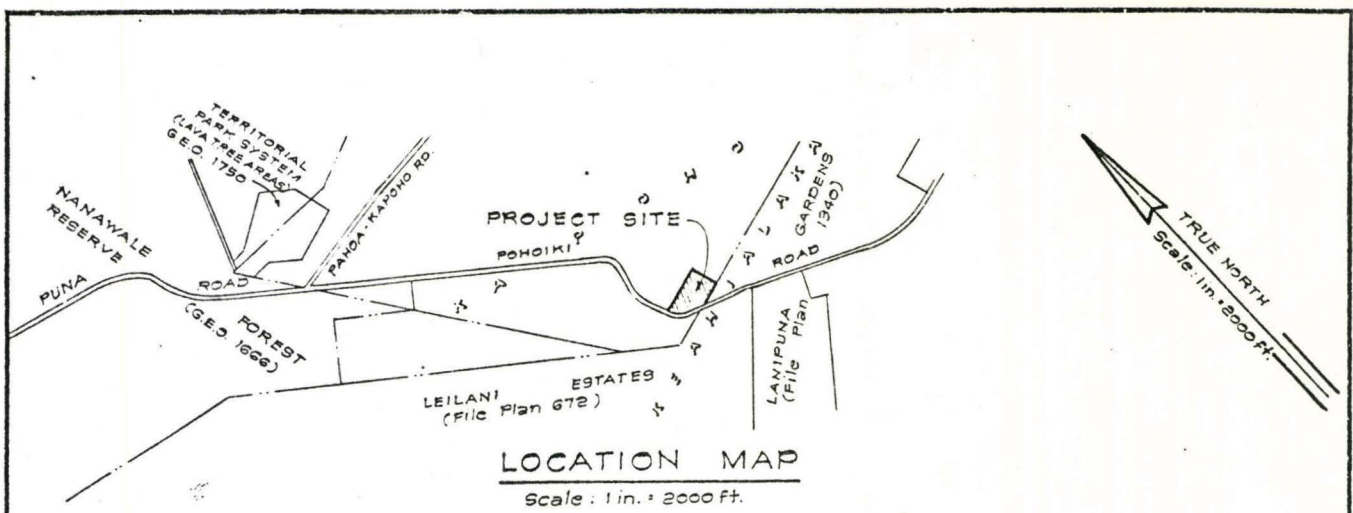
Very truly yours,

for Kaoru Higaki
KAORU HIGAKI
District Engineer

RK:tty

Enclosure

EXHIBIT 22



PROPOSED HAWAII GEOTHERMAL RESEARCH STATION

Kapoho, Puna, Island of Hawaii, Hawaii

Scale: 1 inch = 100 feet

JOB H-8441-F
C. BK 20 ; SAKAMOTO

EXHIBIT ZZ-1

TAX MAP 1-4-01:2

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

C. S. F. No. 18,161

G.N.K. NOV. 10, 1977

SPECIAL PERMIT: DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Public Hearing - 2/23/78

An application has been submitted by the State Department of Planning and Economic Development for a Special Permit to allow the establishment of facilities and activities related to geothermal resources within the State Land Use Agricultural District. The area under consideration is a 4.1-acre portion of a parcel which consists of 353⁺ acres and is owned by the Kapoho Land and Development Company. The Department of Planning and Economic Development, hereafter referred to as DPED, has been authorized by the landowner to submit the Special Permit application.

The 4.1-acre area is the site of the existing geothermal well, identified as HGP-A. It is located approximately one mile makai of Lava Tree State Park, along the east side of Pohoiki Road, Kapoho, Puna (TMK: 1-4-01:portion of 2).

* More specifically, the subject request is to allow the following:

- * 1. Flow tests which are intended to provide more information about the characteristics of the HGP-A well and the Kapoho geothermal reservoir;
2. Installation of a geothermal research facility, identified as the Hawaii Geothermal Research Station, which would include: a) a power generation system and associated equipment and b) a research facility to test electric and non-electric applications of geothermal resources; and

EXHIBIT AAA

3. Use of the power plant and research facility, including the sale of electricity generated.

4. Visitor Center facilities
5. Other related improvements

The proposed research facility would be located in an area of about 200 feet by 400 feet, or approximately 1.84 acres. This portion of the subject area would be surrounded by redwood fencing and plants to mitigate the visual impact of the proposed facility on those sides facing Pohoiki Road. A security chain link fence would also be erected.

For ease of explanation, the components of the proposed facility can be grouped into four distinguishable functions. These are described as follows:

1. An administration and maintenance area which would include an office structure; a laboratory structure; a maintenance building; a maintenance, storage and fabrication yard; and parking.
2. A research and development (R&D) test facility consisting of up to three test pads. The test pads would have concrete floors and be approximately 35 feet by 35 feet in area. They would have roofs over them.
3. Equipment and facilities related to the extraction of geothermal fluids and their conversion to a usable form for the proposed power plant as well as a return system. These would include major improvements such as silencers; a drain

field into which geothermal fluids are presently discharged; a steam-water separator; an iron catalyst system to abate hydrogen sulfide (H_2S) and its odor by turning it into sulfur and which also includes a clarifier, a sludge dryer, compactor and container fill. Also proposed are a possible injection well and pump; an extensive piping system; and cooling towers. The proposed cooling towers would either be 60.5 feet by 29 feet and 18 feet in height or 36-foot square units with 53-foot heights.

4. The power plant which includes a demister; a turbine; a generator, a condensor system; two switchgears; a transformer; load banks for excess power generated which cannot be transmitted; lightning arrestors; and a control trailer and motor control center, each of which would be a transportable 8' x 8' x 24' building module.

It is estimated that design of the proposed system will take approximately one year and that construction of the system and facility will take another year. DPED is the lead agency for the HGP-A Development Group which is made up of representatives of the State, the County of Hawaii, the University of Hawaii and the Hawaii Electric Light Co. It is anticipated that the proposed project will be funded with 80 to 90 percent Federal funds, a State contribution of \$400,000 and \$100,000 in County funds. *The proposed site would either be bought or ~~sold~~ leased.*

In addition, a draft environmental impact statement has been prepared and circulated through the Office of Environmental Quality Control. To date, a final EIS has not been approved. Action cannot be taken by the Planning Commission until the final EIS has been approved.

In support of the subject request, the petitioner has, in part, stated the following:

"The Hawaii Geothermal Research Station will consist of the research power plant and a facility to do research and development of electric and non-electric applications of geothermal resources.

"The research power plant will assist the development of geothermal energy in the State. . . through the early demonstration of the generation of electricity from geothermal heat from a young volcanic geothermal reservoir. The project will assist the industrial sector in evaluating and establishing the operational risk levels associated with energy production from such a source, and help to determine the environmental constraints that may be associated with the long-term production of fluids from a typical volcanic geothermal reservoir.

"The R&D test facility will consist of up to three test pads and pipes to supply the geothermal fluids to the test pads. The R&D of electric applications will include tests of concepts, hardware components, and subsystems. A wide range of non-electric

applications will be tested including agricultural applications, such as controlled-environment cultivation; industrial food-processing, such as canning, freeze-drying and processing fruit and fruit-juices; and aquaculture applications, such as raising nehu."

"The Special Use Permit is requested because, even though the project is an unusual use of agriculturally classified land, it is a reasonable use that will have a minimal effect on the surrounding lands. . . , and, most importantly, the permit is requested because a successful demonstration of geothermal resources for energy and other applications will hasten the overall development of geothermal energy in the Puna District, which will be of great benefit to the County of Hawaii, and, more generally, to the State of Hawaii and all of its people.

"The rapid development of geothermal energy in Puna requires a positive confirmation that the Kapoho Reservoir tapped by HGP-A has an energy potential of the magnitude that has been attributed to it by scientists at the Hawaii Institute of Geophysics (500 MW for 100 years). Therefore a further assessment of the reservoir is needed, and the Hawaii Geothermal Project anticipates conducting a reservoir assessment project, under a separate Federal grant for this purpose. Thus while the reservoir assessment is needed prior to development of the field, and will be conducted in cooperation with the Hawaii Geothermal Research Station project--the subject of this Special Use Permit--it will be a separate project and apply for any permits required separately. The reservoir assessment project will require one or two step-out wells to HGP-A. A

step-out well is a well drilled in relation to another well (usually within a 2,000 ft. circumference) so that tests on one well will contribute data on the other well and the reservoir that they both tap into."

"Selection of the turbine generator and associated equipment suitable for the particular composition of geothermal fluids from HGP-A will require further well testing. It is, therefore, anticipated that short- and long-term flow tests will be conducted prior to and during the construction of the wellhead generator system. During different phases of the project, the following flow tests can be anticipated:

- (a) Period from the award of permit to the initiation of construction phase.

A series of short-term flow tests will be necessary to collect and confirm information for the design of the wellhead turbine generator. The information required includes fluid chemistry, composition of non-condensable gases, fluid heat content, orifice plate size limits, control valve specifications, corrosion samples, reservoir production layers, etc.

The flow tests will be limited to no more than 8 hours per 24-hour period, and will usually be for fewer than 8 hours. They will be conducted between 7 a.m. and 7 p.m. when few persons living in the surrounding area are at

home. The tests will be conducted with the existing silencing equipment. A maximum of 20 such tests are anticipated, and as few as half that number may be required.

- (b) Period during the construction (a nine-month construction period is anticipated).

A series of equipment shakedown tests will be conducted during the construction of various components of the wellhead turbine generator system. The tests will be limited to no more than 8 hours per 24-hour period prior to the installation of more effective equipment to control noise and odor. They will be further limited to between 7 a.m. and 7 p.m. If, however, the odor and noise control systems are installed (they could be in place within a year and a half of the project start date), the flow tests may be continuous for as long as the shakedown tests require.

- (c) Period after effective noise and odor control systems are installed, but prior to the completion of the total turbine generator system.

Long-term flow tests may be initiated to evaluate the Kapoho geothermal anomaly and to conduct interference tests when other wells adjacent to the HGP-A are completed. The flow tests will be continuous on a 24-hour per day basis for as long as needed."

"The successful generation of electricity with geothermal energy from HGP-A will help to persuade the utility to consider using this energy resource for the growing energy needs of the Big Island, instead of constructing additional oil-fueled generating plants. As previously stated, the target date for completion of the power plant is two years after the project's start date.

"It is estimated that HGP-A can produce up to 3.5 megawatts of electricity, of which HELCO has agreed to purchase 1.5 to 3 megawatts. The remaining electricity will be used for experimental purposes in the Station's R&D facility or dissipated in the resistive load banks.

"It is the intention of the HGP-A Development Group to sell the electricity to the utility, but this use requested for the property is nevertheless for research rather than commercial purposes because the objective is to gain experience with the engineering and financial factors involved in producing electricity from a young volcanic reservoir.

"HELCO has stated that they will pay for electricity generated from geothermal steam from HGP-A at a rate equal to HELCO's average cost of energy per net kilowatt hour generated and purchased, or, in other words, approximately \$200,000 to \$260,000 per year for 1.5 to 3 megawatts of electricity. HELCO estimates that operating expenses (labor and supplies) for the power plant will be about \$150,000.

"The current expectation is that the R&D facility for experimenting with electric and non-electric applications of geothermal resources will

be built largely with State funds, although some Federal funds may be available for the facility and the research projects conducted there.

"When the Hawaii Geothermal Research Station (the power plant and the R&D facility) is in place, there will be no adverse effect on surrounding properties because the power plant will muffle the noise that is currently experienced when steam is released from the well and the H₂S abatement equipment will almost totally eliminate H₂S from being released into the atmosphere. Thus when the facility is completed, the noise and hydrogen sulfide problems will be mitigated, and the major nuisance effect will be visual. It will be possible to see the Station's cooling towers from Pohoiki Road. The cooling towers will be 25-30 feet from the road and could be as high as 53 feet. . . . A redwood fence will surround the Station, and it too will be visible from the road. Because of the size of the cooling towers, they will prevent the Station's other facilities from being seen from the road. The towers will be painted to blend in as much as possible with the landscape, and plants and foliage will be used to make the area more visually attractive.

"The flow tests that are proposed prior to the installation of noise and odor control systems will, admittedly, result in increased noise and sulfur levels in the surrounding area. But the tests will be run as previously described for only short periods during the day to minimize the nuisance effect. Only a dozen families presently live within a mile radius of the well, and this type of well-testing has not caused them undue hardship in tests conducted to date. Once the turbine generator and scrubber

are in place, the noise will be muffled, and the hydrogen sulfide (H₂S) scrubbed from the geothermal fluids, so that the impact on the surrounding properties will be minimal."

The General Plan Land Use Pattern Allocation Guide Map designation for the subject area is orchards. Zoning is Agricultural one-acre (A-1a).

The subject area is largely covered by 'a'a lava from the 1955 flow, which is classified as Class VIII by the USDA Soil Conservation Service. The Land Study Bureau's overall agricultural productivity rating is E, or very poor.

Access to the subject area is directly off of Pohoiki Road. Surrounding land uses include scattered residences, diversified agriculture such as papaya and foliage, and vacant lands. Leilani Estates subdivision is approximately 1,000 feet south of the subject area at the subdivision's closest boundary. Lanipuna Gardens is a little less than 1,000 feet from the area under consideration in an easterly direction. The closest dwelling is approximately 2,500 feet west of the subject area (TMK: 1-4-01:20)

In reviewing the subject application, the Department of Agriculture noted the following:

". . .As the exhibits to the application clearly indicate, the potential benefits of this project to agriculture greatly outweigh the potential costs which would involve the loss of small amounts of agricultural land."

The Department of Health commented as follows:

"Our comments are made in a supportive manner. Background data reports odor (H₂S) and noise complaints made by Leilani and Nanawale Estate residents. Air droplets contaminating their rain catchment drinking waters were suspected by the residents and our studies found no concerns. The current submittals project for noise silencers and the scrubbing of the H₂S odor. Recommend the nearby residents be informed through public meetings of your future plans and precautions."

The Department of Research and Development provided the following comments:

- "a. The test facility as proposed is to demonstrate the practical feasibility of utilizing geothermal energy for electricity generation and direct use of this resource.
- b. The County of Hawaii, through the participation of the Managing Director and the Director of the Department of Research and Development, has been active in the planning of this project.
- c. This research program is part of an overall energy development (alternate energy sources) program scheduled for the Big Island in its quest to attain self-sufficiency in energy.
- d. The socio-economic impact of this study, and hopefully, its subsequent development as a viable alternate energy source, can be a boon to our economy.

e. As noted in the environmental impact statement by Robert Kamins (September 1977), the environmental impact appears to be minimal."

The Fire Department noted that the nearest available fire service is through the Kea'au station.

. None of the other cooperating agencies had any objections to or comments on the subject request.

give testimony at that meeting

CONTINUATION OF PUBLIC HEARING: April 27, 1978
SPECIAL PERMIT: DPED

At Feb. 23 meeting, the petitioner or well on Mr. Jack Kipper, Managing Director for the County presented testimony. He was for the public

On February 23, 1978, the Planning Commission held a public hearing on the application of the State Department of Planning and Economic Development for a Special Permit. The purpose of the request is to allow the establishment of facilities and activities related to geothermal resources within the State Land Use Agricultural District. The area under consideration is a 4.1-acre portion of a parcel which consists of 353+ acres and is the site of the existing geothermal well, identified as HGP-A. It is located approximately one mile makai of Lava Tree State Park, along the east side of Pohoiki Road, Kapoho, Puna (TMK: 1-4-01: por. 2).

on first test date

The Commission, at the ~~February 23rd~~ hearing, voted to continue the public hearing until such time that the environmental impact statement was accepted by the Governor. In a letter dated April 14, 1978, the Director of the Department of Planning and Economic Development informed the Planning Director that the Governor had accepted the revised EIS on April 12, 1978.

In the intervening period between the public hearing and the EIS acceptance, the petitioner clarified one of the questions raised at the public hearing. In a letter dated April 4, 1978, the following information was provided:

"At the public hearing before the Hawaii County Planning Commission on February 23, 1978, a question was raised as to whether or not the subject Special Use Permit should be granted for the 4.1 acre(s) as requested in our petition, or be limited to the approximately 1.8 acres which the facility itself is expected to occupy.

EXHIBIT BB3

"At the time of the hearing, we indicated that we felt the 1.8 acres would be adequate inasmuch as no facilities were being contemplated for the remaining area. Since then however, we have re-evaluated our facility requirements, and find that the entire 4.1 acres will be required for the proposed research facility use.

". . . (W)e anticipate that uses such as drain fields, an aquaculture pond, visitor center and access roads will utilize the remainder of the 4.1 acres.

"By this letter, we are therefore requesting that the entire 4.1 acres be approved for the proposed research facility use. We would like to stress that the attached drawing is conceptual in nature, and subject to change depending on the availability of project funds and other factors."

RECOMMENDATION: STATE DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Action: June 1, 1978

Upon careful review of the subject request against the guidelines for granting a Special Permit, staff is recommending that it be given favorable consideration based on the following findings:

1. The proposed use will not be contrary to the objectives sought to be accomplished by the State Land Use Law and Regulations. The Land Use Law and Regulations are intended to preserve, protect, and encourage the development of lands in the State for those uses to which these lands are best suited in the interest of public health and welfare of the people.

The Agricultural District category, within which the subject area is situated, includes those lands with a high capacity or potential for agricultural uses. It also includes lands surrounded by or contiguous to agricultural lands and which are not suited to agricultural and ancillary activities by reason of topography, soils and other related characteristics. The subject area is largely covered by 'a' lava from the 1955 flow, and is classified as Class VIII by the USDA Soil Conservation Service. This class of soils is the lowest in the Soil Conservation Service's rating system. The Land Study Bureau's Overall Capability Rating for these soils is Class "E" or "Very Poor". Although it is possible for^{for} some agricultural activity to be conducted on these soils, as evidenced by the surrounding agricultural uses, it is determined that the use of this parcel for the

proposed activities will not adversely affect the agricultural potential of the region, the island, and the State.

Further, the proposed use will not substantially alter or change the essential character of the land and its present use since the land has been established as a geothermal development site as a result of the test drilling which was conducted in 1976. Therefore, effects on agricultural production of the subject 4+ - acre site would be further mitigated. Should the proposed project prove to be successful, geothermal energy and its by-products could possibly have a positive impact ^{on} ~~to~~ agricultural activities, and possibly even be able to service some urban-related needs.

The geothermal water could be used for agricultural irrigation, ~~purpos~~ ~~purposes,~~ and the by-products of the geothermal water could also be used for other agricultural purposes. It is therefore determined that the granting of this particular request also would not be in conflict with the State and County's agricultural policies. In fact, it may even further foster agricultural development in the general area.

(continue next page)

2. That unusual conditions, trends, and needs have arisen since the district boundaries and regulation were established.

Electricity is the major form of energy utilized in Hawaii. Most of the electricity is obtained through the burning of imported oil. Nationally, for the remainder of the 20th Century, most of the energy demand will be met with fossil fuels and nuclear fission. In turn, fossil fuels are fast becoming a scarce world commodity due to increasing demand. Hawaii is currently most vulnerable to dislocations in the global oil market, but is also endowed with a variety of natural energy resource alternatives which are renewable or inexhaustible and potentially low polluting. Hawaii's near total dependence on imported petroleum provides the incentive for the promotion of energy conservation and the development of technology to harness local natural energy resources, such as geothermal. Therefore, the primary

(Continue next page)

goal of the County of Hawaii relative to energy is "Energy self-sufficiency". It is felt that we must strive to attain energy self-sufficiency in order to minimize the dependence on imported fossil fuels. A commitment must be made by both the government and the public for research, planning, and development to attain the goal of energy self-sufficiency. In doing so, the County as well as the entire State would be benefited.

As a result of the 1974 oil crisis, there has been concern over Hawaii's dependence on imported petroleum. Recognizing this concern, the Hawaii County General Plan has stated as a policy that the "County shall encourage the continuation of studies concerning the development of power which can be distributed at lower costs to consumers." Further, the State Legislature has since then enacted several significant bills which were designed to promote the research and development of natural energy resources, and the conservation of energy in order to foster a greater independence from imported fossil fuels. However, prior to 1974, the Hawaii Geothermal Project (HGP), which is a cooperative project involving Federal, State, County and private funds, was organized to investigate the development of geothermal energy. The subject property was selected as a test site. In April 1976, a successful well was drilled and completed, and as a result, HGP has proposed the installation of a research power plant

to demonstrate that geothermal energy is an economically viable natural energy alternative.

The nation is embarking on an aggressive program to develop its indigenous resources of geothermal energy. For over a decade, geothermal energy has been proclaimed as one of the more promising forms of alternate energy supply. It has been the County and State's policy to encourage the development of alternative energy power. Both levels of government, as well as the Federal Government, has provided substantial funding and services for energy resource research and development to reduce the State's dependence on imported fuels. The island of Hawaii is believed to possess a vast resource base of geothermal heat. The test drilling at this site demonstrated the existence of a valuable geothermal energy source. However, the extent and magnitude of geothermal resources in Hawaii must still be determined. There is no way of knowing if the island actually has a geothermal resource of economic importance unless further testing is conducted. As a potential power source, geothermal may either prove to be of major importance or no importance at all. Only by further testing can this uncertainty be resolved. It is from these exploratory ^{projects} ~~works~~ that data for evaluating the suitability of the resources as a production reservoir are obtained. Therefore, by allowing the proposed use, we would also be in the direction of

fulfilling the County's goal of encouraging and supporting the expansion of the research and development industry. The development of geothermal power could bring the County closer to becoming a scientific model as articulated under the Economic Element of the General Plan.

Geothermal energy source could have tremendous benefits for people of this County as well as the rest of the State. Aside from providing power, the successfulness of the geothermal project can also be a major factor in accomplishing several other goals. A reduction in the County's current high cost of energy could aid existing industries as well as possibly attract new endeavors. Should the project prove successful, it can open the doors for economic development of a nature and magnitude beyond the realm of reality a few years ago. The success of geothermal energy could possibly stimulate economic activity which would provide new employment opportunities for the residents of the County. New industries, such as the mining and processing of manganese nodules, will be attracted into the area in the event that large amounts of power become available. These industries would provide job opportunities for construction, operation and other essential services. Thus, if the source of geothermal energy is successful and properly developed, it will be of great importance and benefit to the future of Hawaii.

By allowing the proposed use, we will be in the direction of fulfilling the goals of the General Plan's Public Utilities element of "ensuring that adequate, efficient and dependable public utility service will be available to users", and "Maximizing efficiency and economy in the provision of public utility services".

It is therefore felt that the granting of the subject request at its particular location would be in the direction of fulfilling the County's General Plan's goals and policies, as well as that of the State Land Use Law and Regulations relative to providing for the public's welfare.

3. Although it has been pointed out that the proposed use of the land for its intended purpose may have some adverse

(next page)

effects, such as problems of noise and fumes, to the surrounding property and the residents in the immediate area, stringent controls and conditions will be attached to this Special Permit in order that the concerns may be alleviated. The petitioner will be required to comply with all applicable requirements of the State of Hawaii Department of Health.

Finally, we are cognizant of the fact, that the granting of this particular Special Permit may lead to similar types of requests. As such, it should be pointed out that we are working on a policy of such exploratory programs to minimize rampant development of test sites. The qualification of our favorable recommendation to allow the petitioner to proceed with this development is that the total project shall be closely monitored and the petitioner will be held accountable to stringent standards to insure minimal damage to our environment. We are cognizant of the possible dangers to health of residents in the area, and as stated earlier, will require preventative measures as conditions of approval of the Special Permit.

At this time, it should be pointed out that as part of the County's General Plan Update Program, the Planning Department has drafted a new ^{Energy} element for inclusion in the General Plan document. Certain goals and policies ^{relative to the development of geothermal and other energy resources} are being proposed.

Staff is further recommending that the request be given favorable consideration subject to the following conditions:

- Desig*
1. That the landowner, Kapoho Land Co., or its authorized representative shall submit a subdivision plan and receive tentative approval within one (1) year from the effective date of the Special Permit. The landowner/representative shall also be responsible for securing final subdivision approval.
 2. That plans for Plan Approval be submitted within two (2) years from the effective date of approval of the Special Permit.
 3. That construction of the proposed facility commence within one (1) year from the effective date of receipt of final Plan Approval and be completed within three (3) years thereafter.
 4. That a landscaping buffer or screening zone be provided along the main highway fronting the subject property. The landscaping plans shall be submitted to the Planning Department for review and approval at the time of Plan Approval.
 5. That the rules, regulations, and requirements of the State Department of Health shall be complied with.
 6. That the petitioner or its authorized representative shall be responsible in assuring that every precaution is taken to reduce any nuisances, whether it be noise

or fumes, which may affect the residents and properties in the immediate area. Should it be determined by the Planning Director that these precautionary measures are not being applied, he will prepare and present a written report to the Planning Commission for its appropriate action which may involve the termination of the Special Permit.

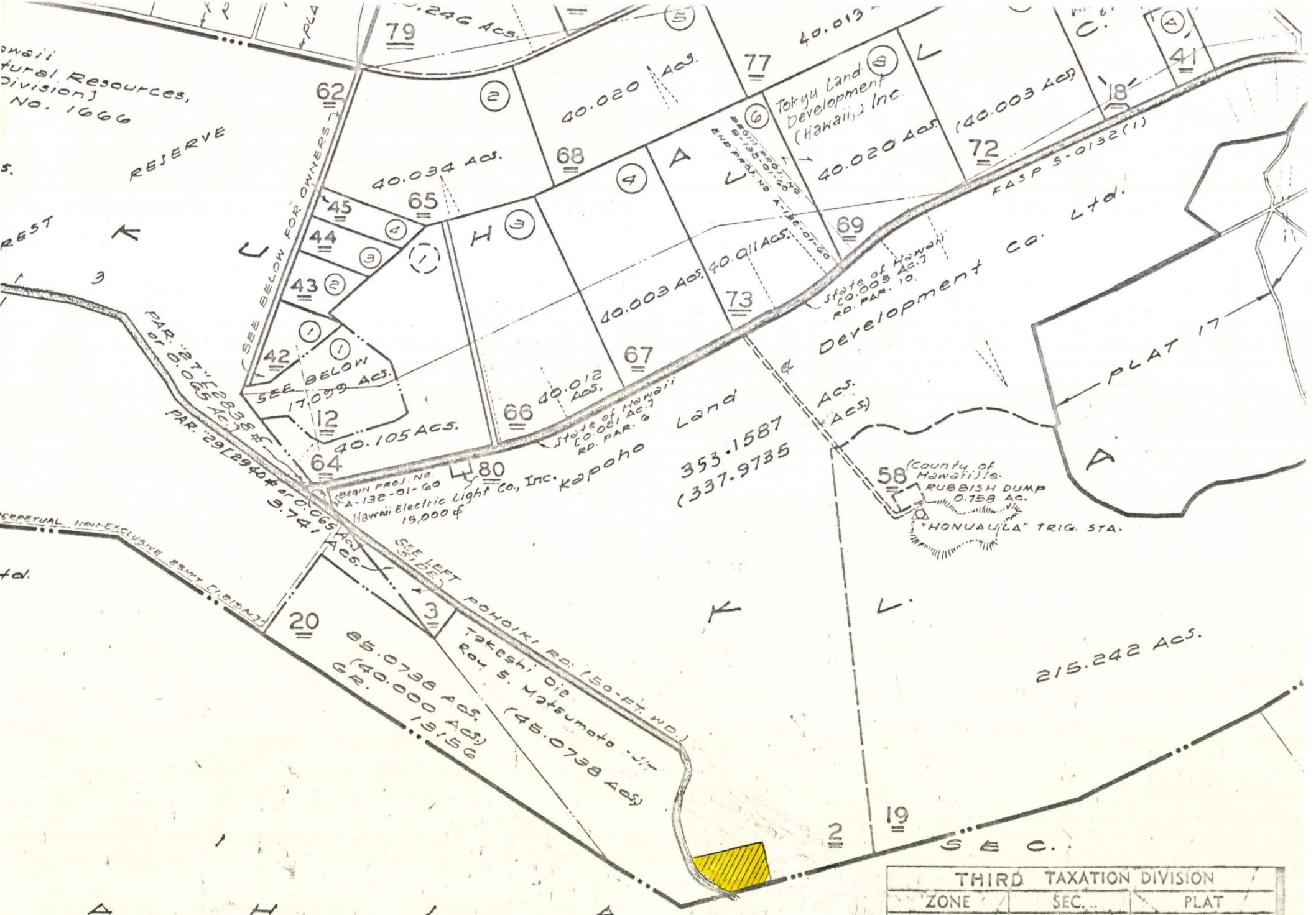
7. That the requirements of the County Grading ^{Ord.} ~~Permit~~ shall be complied with.
8. That should any unanticipated archaeological or historical sites be found on the subject property, the petitioner/
representative shall ~~immediately~~ immediately notify the Planning Department. *and cease operation until a decision to recommence work is given by the Department.*
9. That upon termination of the operation or if the petitioner determined that the project is not feasible, all structures erected shall be dismantled and removed from the site.
10. That ^{only a maximum of two (2)} ~~only one~~ access shall be permitted from the main highway meeting with the approval of the Chief Engineer of the County Department of Public Works.
11. That all other applicable rules and regulations shall be complied with.

Failure to comply with any of the delineated conditions of approval, particularly those relating to time commencement and expiration, shall be reason for termination of the Special Permit. Also, requests for any time extension filed after the stipulated commencement or expiration dates shall not be approved.

SP28-307

DPED

Exhibit DDD



THIRD TAXATION DIVISION		
ZONE	SEC.	PLAT
1	4	01
SCALE 1 IN. = 1000 FT. JUL 19 1978		

County of Hawaii

Date June 1, 1978

Development - Special Permit

 Preliminary hearing Public hearing Request ☒ Action

ACTION: Approve

Deny

Defer

Continue

Schedule for public hearing

Other: _____

Commissioners	Aye	No	Excused	Abstain
FUJIMOTO, Shigeru	✓			
HANLEY, J. Walsh			✓	
JITCHAKU, Lorraine R. 2 nd	✓			
MURAKAMI, Haruo Moved	✓			
NAKANO, Bert H.	✓			
ORITA, Alfredo	✓			
PARIS, William Jr.	✓			
SAKAMOTO, Charles	✓			
MIELCKE, William F.	✓			

EXHIBIT 333

PLANNING COMMISSION

Planning Department
County of Hawaii

EXHIBIT FFF

MINUTES
June 1, 1978

The Planning Commission met in regular session at 1:00 p.m. in the Councilroom, County Building, South Hilo, Hawaii, with Chairman William F. Mielcke Presiding.

PRESENT: William F. Mielcke
Shigeru Fujimoto
Lorraine R. Jitchaku
Haruo Murakami
Bert H. Nakano
Alfredo Orita
William J. Paris, Jr.
Charles H. Sakamoto

ABSENT: J. Walsh Hanley

Ex-officio Member
Akira Fujimoto

Sidney M. Fuke, Director
Ilima Piianaia, Planner
Keith Kato, Planner
William Moore (Left at 4:30 p.m.)
Francis Saiki (Left at 4:30 p.m.)

Galen Kubo, representing Ex-officio Member Edward Harada
Lionel Meyer, Deputy Corporation Counsel

and about 9 people at 1:00 p.m., 7 people at 3:37 p.m.,
and 21 people at 6:30 p.m.

All those testifying were duly sworn in.

SPECIAL PERMIT
STATE OF HAWAII
DEPARTMENT OF
PLANNING AND
ECONOMIC
KAPOHO, PUNA

Application of the State of Hawaii Department of Planning and Economic Development for a Special Permit to allow the establishment of a geothermal research facility and to conduct flow tests within the State Land Use Agricultural District. The area involved consists of approximately 4.0 acres of land

located about one (1) mile makai of Lava Tree State Park on the east side of Pohoiki Road, Kapoho, Puna, TMK: 1-4-01:portion of 2.

Staff presented recommendation for approval with conditions on file.

With regard to Condition 1, Commissioner Jitchaku asked for a clarification on whether the State can go ahead with its plans as far as the operational process if the landowner hasn't submitted a subdivision plan. Staff responded that Condition 1 is worded such that the test well could be operated, but plans for subdivision have to be submitted and receive tentative approval within one year.

The petitioner's representative, Bill Chen, was in attendance. With regard to Condition 10, Mr. Chen said that as they are going to build a visitor information center, they will be needing two accesses so that busses can go in one way and out the other, rather than have a turn-around area. Mr. Chen asked about an existing 20-foot easement on the southern side of the property which provides access to another property. Staff replied that it would be considered as one access. The Planning Director pointed out that if they elect not to utilize that easement because it doesn't suit their purposes, then they would have to extinguish that easement and find another easement as the Department is trying to minimize the accesses. He added that another alternative could be to retain that easement, but within the parcel, they would have to eventually hook it up to that particular point but provide an interior circulation system.

It was moved by Commissioner Murakami and seconded by Commissioner Jitchaku to send a favorable recommendation to the State Land Use Commission with the conditions outlined by the staff. A roll call vote was taken and motion carried with eight ayes.

SPECIAL PERMIT
KONA CHURCH
OF GOD
KOHANAIKI,
NORTH KONA

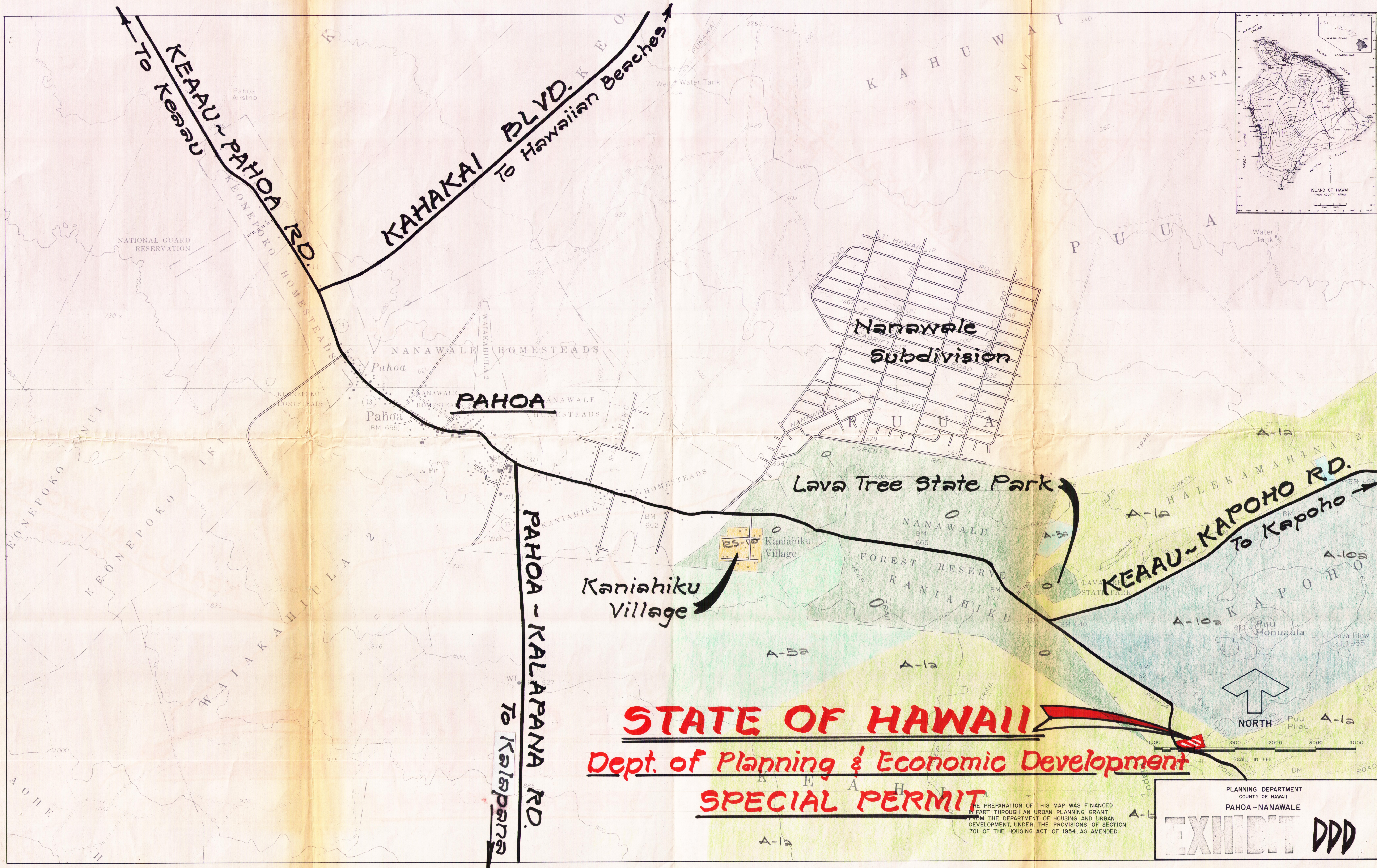
Application of Kona Church of God for a Special Permit to allow the establishment of a church on 1.139 acres of land situated within the State Land Use Agricultural District. The property involved is located along the makai side of the Mamalahoa Highway,

approximately 650 feet north of Kaloko Drive, Kohanaiki, North Kona, TMK: 7-3-19:24.

Staff presented recommendation for approval with conditions on file.

SP78-307 - DPED

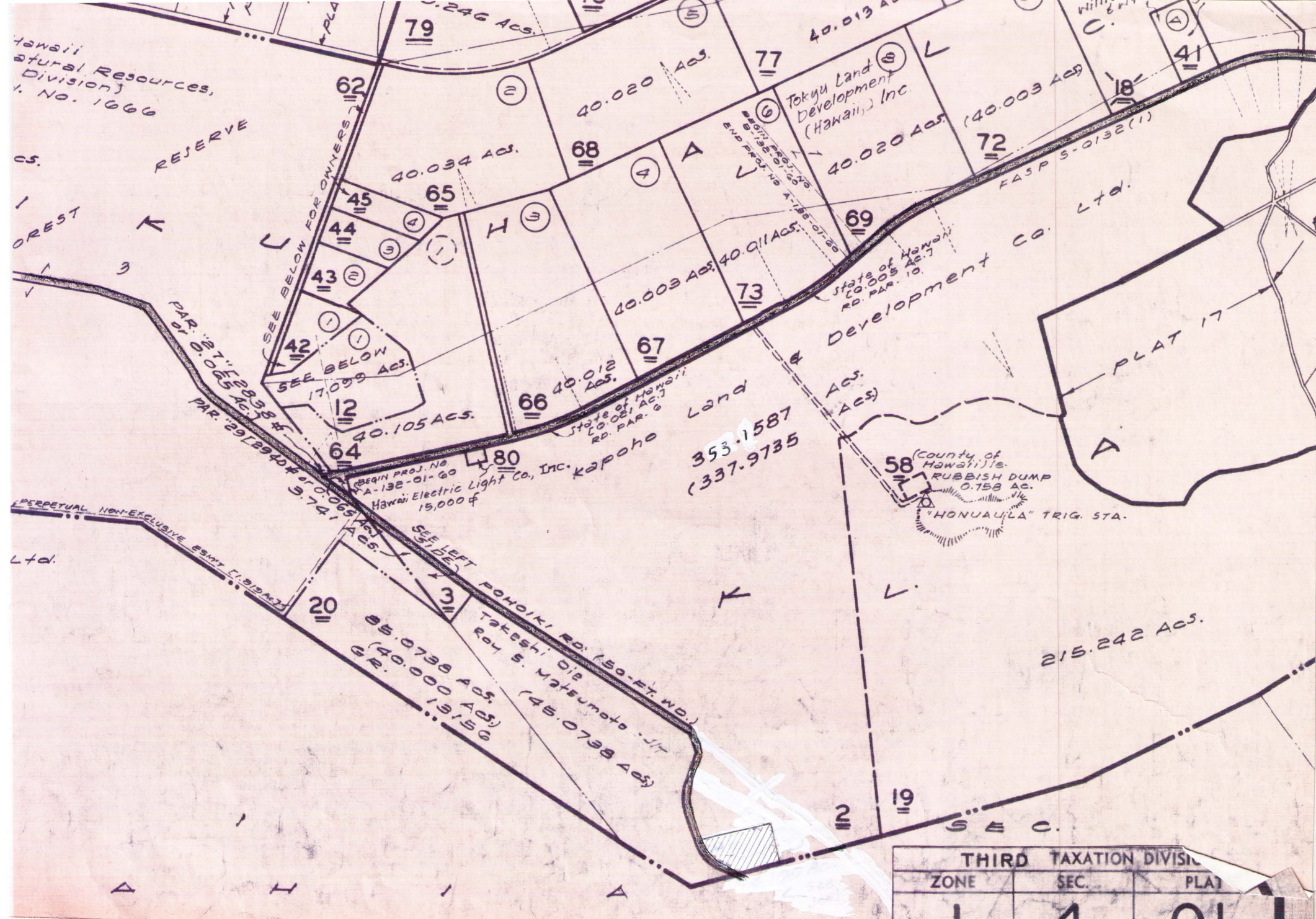
LUC
MAPS



STATE OF HAWAII
Dept. of Planning & Economic Development
SPECIAL PERMIT

THE PREPARATION OF THIS MAP WAS FINANCED IN PART THROUGH AN URBAN PLANNING GRANT FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, UNDER THE PROVISIONS OF SECTION 701 OF THE HOUSING ACT OF 1954, AS AMENDED.

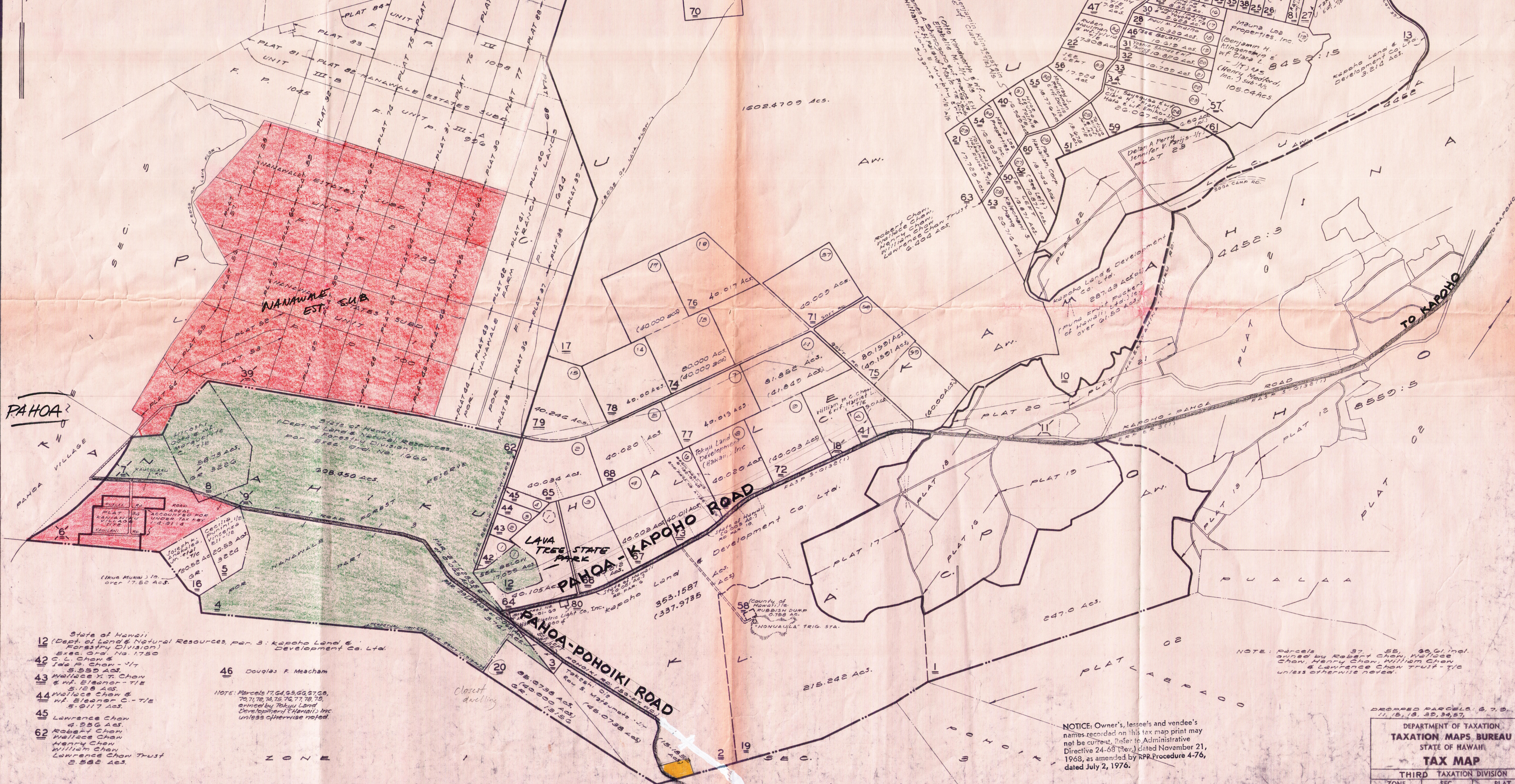
PLANNING DEPARTMENT
COUNTY OF HAWAII
PAHOA-NANAWALE
EXHIBIT DDD



THIRD TAXATION DIVISION		
ZONE	SEC.	PLAT
1	4	01
SCALE: 1 IN. = 1000 FT. JUL 19 1978		

- 24 Herbert M. Torioco,
James H. Torioco &
Franklin Y. Torioco - T/C
- 25 Hirotochi Yamamoto
- 37 Alexander T. Kini & Wf.
Puanani H. - T/E
- 35 Ray Hill Company
- 26 Warren S. Brown & Wf.
Antoinette O. - T/E
(Randolph K. Reid &
Wf. Laurie B. - T/E) A/S
- 48 Glenn H. Okada
- 49 Toshio Torioco & Wf. Yukiko K. - T/E
- 50 Yasuyuki Inaba
(Gary L. Martin & Wf. Betty L. - T/E) A/S
- 52 Haruko Akiyama
(Gary L. Martin & Wf. Betty L. - T/E) A/S
- 56 Shunichi Yamada & Wf.
Jennie - T/C - 1/2
Ryuichi Yamada & Wf.
Alice L. - T/C - 1/2

TRUE NORTH
SCALE 1" = 1000 FT.



- 12 State of Hawaii
(Dept. of Land & Natural Resources, per. 3: Kapoho Land &
Development Co. Ltd.)
Exec. Ord. No. 1750
- 42 C. L. Chow &
Jale P. Chow - J/T
5,550 Acs.
- 43 Wallace K. T. Chow
& Wf. Eleanor - T/E
5,128 Acs.
- 44 Wallace Chow &
Wf. Eleanor - T/E
5,917 Acs.
- 45 Lawrence Chow
& Wf. Eleanor - T/E
2,550 Acs.
- 62 Robert Chow,
Wallace Chow,
Henry Chow,
William Chow,
Lawrence Chow Trust
2,550 Acs.
- 46 Douglas F. Meacham
- NOTE: Parcels 17, 64, 65, 66, 67, 68,
70, 71, 72, 73, 74, 75, 76, 77, 78, 79,
80, 81, 82, 83, 84, 85, 86, 87, 88,
89, 90, 91, 92, 93, 94, 95, 96, 97, 98,
99, 100, 101, 102, 103, 104, 105, 106,
107, 108, 109, 110, 111, 112, 113, 114,
115, 116, 117, 118, 119, 120, 121, 122,
123, 124, 125, 126, 127, 128, 129, 130,
131, 132, 133, 134, 135, 136, 137, 138,
139, 140, 141, 142, 143, 144, 145, 146,
147, 148, 149, 150, 151, 152, 153, 154,
155, 156, 157, 158, 159, 160, 161, 162,
163, 164, 165, 166, 167, 168, 169, 170,
171, 172, 173, 174, 175, 176, 177, 178,
179, 180, 181, 182, 183, 184, 185, 186,
187, 188, 189, 190, 191, 192, 193, 194,
195, 196, 197, 198, 199, 200, 201, 202,
203, 204, 205, 206, 207, 208, 209, 210,
211, 212, 213, 214, 215, 216, 217, 218,
219, 220, 221, 222, 223, 224, 225, 226,
227, 228, 229, 230, 231, 232, 233, 234,
235, 236, 237, 238, 239, 240, 241, 242,
243, 244, 245, 246, 247, 248, 249, 250,
251, 252, 253, 254, 255, 256, 257, 258,
259, 260, 261, 262, 263, 264, 265, 266,
267, 268, 269, 270, 271, 272, 273, 274,
275, 276, 277, 278, 279, 280, 281, 282,
283, 284, 285, 286, 287, 288, 289, 290,
291, 292, 293, 294, 295, 296, 297, 298,
299, 300, 301, 302, 303, 304, 305, 306,
307, 308, 309, 310, 311, 312, 313, 314,
315, 316, 317, 318, 319, 320, 321, 322,
323, 324, 325, 326, 327, 328, 329, 330,
331, 332, 333, 334, 335, 336, 337, 338,
339, 340, 341, 342, 343, 344, 345, 346,
347, 348, 349, 350, 351, 352, 353, 354,
355, 356, 357, 358, 359, 360, 361, 362,
363, 364, 365, 366, 367, 368, 369, 370,
371, 372, 373, 374, 375, 376, 377, 378,
379, 380, 381, 382, 383, 384, 385, 386,
387, 388, 389, 390, 391, 392, 393, 394,
395, 396, 397, 398, 399, 400, 401, 402,
403, 404, 405, 406, 407, 408, 409, 410,
411, 412, 413, 414, 415, 416, 417, 418,
419, 420, 421, 422, 423, 424, 425, 426,
427, 428, 429, 430, 431, 432, 433, 434,
435, 436, 437, 438, 439, 440, 441, 442,
443, 444, 445, 446, 447, 448, 449, 450,
451, 452, 453, 454, 455, 456, 457, 458,
459, 460, 461, 462, 463, 464, 465, 466,
467, 468, 469, 470, 471, 472, 473, 474,
475, 476, 477, 478, 479, 480, 481, 482,
483, 484, 485, 486, 487, 488, 489, 490,
491, 492, 493, 494, 495, 496, 497, 498,
499, 500, 501, 502, 503, 504, 505, 506,
507, 508, 509, 510, 511, 512, 513, 514,
515, 516, 517, 518, 519, 520, 521, 522,
523, 524, 525, 526, 527, 528, 529, 530,
531, 532, 533, 534, 535, 536, 537, 538,
539, 540, 541, 542, 543, 544, 545, 546,
547, 548, 549, 550, 551, 552, 553, 554,
555, 556, 557, 558, 559, 560, 561, 562,
563, 564, 565, 566, 567, 568, 569, 570,
571, 572, 573, 574, 575, 576, 577, 578,
579, 580, 581, 582, 583, 584, 585, 586,
587, 588, 589, 590, 591, 592, 593, 594,
595, 596, 597, 598, 599, 600, 601, 602,
603, 604, 605, 606, 607, 608, 609, 610,
611, 612, 613, 614, 615, 616, 617, 618,
619, 620, 621, 622, 623, 624, 625, 626,
627, 628, 629, 630, 631, 632, 633, 634,
635, 636, 637, 638, 639, 640, 641, 642,
643, 644, 645, 646, 647, 648, 649, 650,
651, 652, 653, 654, 655, 656, 657, 658,
659, 660, 661, 662, 663, 664, 665, 666,
667, 668, 669, 670, 671, 672, 673, 674,
675, 676, 677, 678, 679, 680, 681, 682,
683, 684, 685, 686, 687, 688, 689, 690,
691, 692, 693, 694, 695, 696, 697, 698,
699, 700, 701, 702, 703, 704, 705, 706,
707, 708, 709, 710, 711, 712, 713, 714,
715, 716, 717, 718, 719, 720, 721, 722,
723, 724, 725, 726, 727, 728, 729, 730,
731, 732, 733, 734, 735, 736, 737, 738,
739, 740, 741, 742, 743, 744, 745, 746,
747, 748, 749, 750, 751, 752, 753, 754,
755, 756, 757, 758, 759, 760, 761, 762,
763, 764, 765, 766, 767, 768, 769, 770,
771, 772, 773, 774, 775, 776, 777, 778,
779, 780, 781, 782, 783, 784, 785, 786,
787, 788, 789, 790, 791, 792, 793, 794,
795, 796, 797, 798, 799, 800, 801, 802,
803, 804, 805, 806, 807, 808, 809, 810,
811, 812, 813, 814, 815, 816, 817, 818,
819, 820, 821, 822, 823, 824, 825, 826,
827, 828, 829, 830, 831, 832, 833, 834,
835, 836, 837, 838, 839, 840, 841, 842,
843, 844, 845, 846, 847, 848, 849, 850,
851, 852, 853, 854, 855, 856, 857, 858,
859, 860, 861, 862, 863, 864, 865, 866,
867, 868, 869, 870, 871, 872, 873, 874,
875, 876, 877, 878, 879, 880, 881, 882,
883, 884, 885, 886, 887, 888, 889, 890,
891, 892, 893, 894, 895, 896, 897, 898,
899, 900, 901, 902, 903, 904, 905, 906,
907, 908, 909, 910, 911, 912, 913, 914,
915, 916, 917, 918, 919, 920, 921, 922,
923, 924, 925, 926, 927, 928, 929, 930,
931, 932, 933, 934, 935, 936, 937, 938,
939, 940, 941, 942, 943, 944, 945, 946,
947, 948, 949, 950, 951, 952, 953, 954,
955, 956, 957, 958, 959, 960, 961, 962,
963, 964, 965, 966, 967, 968, 969, 970,
971, 972, 973, 974, 975, 976, 977, 978,
979, 980, 981, 982, 983, 984, 985, 986,
987, 988, 989, 990, 991, 992, 993, 994,
995, 996, 997, 998, 999, 1000, 1001, 1002,
1003, 1004, 1005, 1006, 1007, 1008, 1009,
1010, 1011, 1012, 1013, 1014, 1015, 1016,
1017, 1018, 1019, 1020, 1021, 1022, 1023,
1024, 1025, 1026, 1027, 1028, 1029, 1030,
1031, 1032, 1033, 1034, 1035, 1036, 1037,
1038, 1039, 1040, 1041, 1042, 1043, 1044,
1045, 1046, 1047, 1048, 1049, 1050, 1051,
1052, 1053, 1054, 1055, 1056, 1057, 1058,
1059, 1060, 1061, 1062, 1063, 1064, 1065,
1066, 1067, 1068, 1069, 1070, 1071, 1072,
1073, 1074, 1075, 1076, 1077, 1078, 1079,
1080, 1081, 1082, 1083, 1084, 1085, 1086,
1087, 1088, 1089, 1090, 1091, 1092, 1093,
1094, 1095, 1096, 1097, 1098, 1099, 1100,
1101, 1102, 1103, 1104, 1105, 1106, 1107,
1108, 1109, 1110, 1111, 1112, 1113, 1114,
1115, 1116, 1117, 1118, 1119, 1120, 1121,
1122, 1123, 1124, 1125, 1126, 1127, 1128,
1129, 1130, 1131, 1132, 1133, 1134, 1135,
1136, 1137, 1138, 1139, 1140, 1141, 1142,
1143, 1144, 1145, 1146, 1147, 1148, 1149,
1150, 1151, 1152, 1153, 1154, 1155, 1156,
1157, 1158, 1159, 1160, 1161, 1162, 1163,
1164, 1165, 1166, 1167, 1168, 1169, 1170,
1171, 1172, 1173, 1174, 1175, 1176, 1177,
1178, 1179, 1180, 1181, 1182, 1183, 1184,
1185, 1186, 1187, 1188, 1189, 1190, 1191,
1192, 1193, 1194, 1195, 1196, 1197, 1198,
1199, 1200, 1201, 1202, 1203, 1204, 1205,
1206, 1207, 1208, 1209, 1210, 1211, 1212,
1213, 1214, 1215, 1216, 1217, 1218, 1219,
1220, 1221, 1222, 1223, 1224, 1225, 1226,
1227, 1228, 1229, 1230, 1231, 1232, 1233,
1234, 1235, 1236, 1237, 1238, 1239, 1240,
1241, 1242, 1243, 1244, 1245, 1246, 1247,
1248, 1249, 1250, 1251, 1252, 1253, 1254,
1255, 1256, 1257, 1258, 1259, 1260, 1261,
1262, 1263, 1264, 1265, 1266, 1267, 1268,
1269, 1270, 1271, 1272, 1273, 1274, 1275,
1276, 1277, 1278, 1279, 1280, 1281, 1282,
1283, 1284, 1285, 1286, 1287, 1288, 1289,
1290, 1291, 1292, 1293, 1294, 1295, 1296,
1297, 1298, 1299, 1300, 1301, 1302, 1303,
1304, 1305, 1306, 1307, 1308, 1309, 1310,
1311, 1312, 1313, 1314, 1315, 1316, 1317,
1318, 1319, 1320, 1321, 1322, 1323, 1324,
1325, 1326, 1327, 1328, 1329, 1330, 1331,
1332, 1333, 1334, 1335, 1336, 1337, 1338,
1339, 1340, 1341, 1342, 1343, 1344, 1345,
1346, 1347, 1348, 1349, 1350, 1351, 1352,
1353, 1354, 1355, 1356, 1357, 1358, 1359,
1360, 1361, 1362, 1363, 1364, 1365, 1366,
1367, 1368, 1369, 1370, 1371, 1372, 1373,
1374, 1375, 1376, 1377, 1378, 1379, 1380,
1381, 1382, 1383, 1384, 1385, 1386, 1387,
1388, 1389, 1390, 1391, 1392, 1393, 1394,
1395, 1396, 1397, 1398, 1399, 1400, 1401,
1402, 1403, 1404, 1405, 1406, 1407, 1408,
1409, 1410, 1411, 1412, 1413, 1414, 1415,
1416, 1417, 1418, 1419, 1420, 1421, 1422,
1423, 1424, 1425, 1426, 1427, 1428, 1429,
1430, 1431, 1432, 1433, 1434, 1435, 1436,
1437, 1438, 1439, 1440, 1441, 1442, 1443,
1444, 1445, 1446, 1447, 1448, 1449, 1450,
1451, 1452, 1453, 1454, 1455, 1456, 1457,
1458, 1459, 1460, 1461, 1462, 1463, 1464,
1465, 1466, 1467, 1468, 1469, 1470, 1471,
1472, 1473, 1474, 1475, 1476, 1477, 1478,
1479, 1480, 1481, 1482, 1483, 1484, 1485,
1486, 1487, 1488, 1489, 1490, 1491, 1492,
1493, 1494, 1495, 1496, 1497, 1498, 1499,
1500, 1501, 1502, 1503, 1504, 1505, 1506,
1507, 1508, 1509, 1510, 1511, 1512, 1513,
1514, 1515, 1516, 1517, 1518, 1519, 1520,
1521, 1522, 1523, 1524, 1525, 1526, 1527,
1528, 1529, 1530, 1531, 1532, 1533, 1534,
1535, 1536, 1537, 1538, 1539, 1540, 1541,
1542, 1543, 1544, 1545, 1546, 1547, 1548,
1549, 1550, 1551, 1552, 1553, 1554, 1555,
1556, 1557, 1558, 1559, 1560, 1561, 1562,
1563, 1564, 1565, 1566, 1567, 1568, 1569,
1570, 1571, 1572, 1573, 1574, 1575, 1576,
1577, 1578, 1579, 1580, 1581, 1582, 1583,
1584, 1585, 1586, 1587, 1588, 1589, 1590,
1591, 1592, 1593, 1594, 1595, 1596, 1597,
1598, 1599, 1600, 1601, 1602, 1603, 1604,
1605, 1606, 1607, 1608, 1609, 1610, 1611,
1612, 1613, 1614, 1615, 1616, 1617, 1618,
1619, 1620, 1621, 1622, 1623, 1624, 1625,
1626, 1627, 1628, 1629, 1630, 1631, 1632,
1633, 1634, 1635, 1636, 1637, 1638, 1639,
1640, 1641, 1642, 1643, 1644, 1645, 1646,
1647, 1648, 1649, 1650, 1651, 1652, 1653,
1654, 1655, 1656, 1657, 1658, 1659, 1660,
1661, 1662, 1663, 1664, 1665, 1666, 1667,
1668, 1669, 1670, 1671, 1672, 1673, 1674,
1675, 1676, 1677, 1678, 1679, 1680, 1681,
1682, 1683, 1684, 1685, 1686, 1687, 1688,
1689, 1690, 1691, 1692, 1693, 1694, 1695,
1696, 1697, 1698, 1699, 1700, 1701, 1702,
1703, 1704, 1705, 1706, 1707, 1708, 1709,
1710, 1711, 1712, 1713, 1714, 1715, 1716,
1717, 1718, 1719, 1720, 1721, 1722, 1723,
1724, 1725, 1726, 1727, 1728, 1729, 1730,
1731, 1732, 1733, 1734, 1735, 1736, 1737,
1738, 1739, 1740, 1741, 1742, 1743, 1744,
1745, 1746, 1747, 1748, 1749, 1750, 1751,
1752, 1753, 1754, 1755, 1756, 1757, 1758,
1759, 1760, 1761, 1762, 1763, 1764, 1765,
1766, 1767, 1768, 1769, 1770, 1771, 1772,
1773, 1774, 1775, 1776, 1777, 1778, 1779,
1780, 1781, 1782, 1783, 1784, 1785, 1786,
1787, 1788, 1789, 1790, 1791, 1792, 1793,
1794, 1795, 1796, 1797, 1798, 1799, 1800,
1801, 1802, 1803, 1804, 1805, 1806, 1807,
1808, 1809, 1810, 1811, 1812, 1813, 1814,
1815, 1816, 1817, 1818, 1819, 1820, 1821,
1822, 1823, 1824, 1825, 1826, 1827, 1828,
1829, 1830, 1831, 1832, 1833, 1834, 1835,
1836, 1837, 1838, 1839, 1840, 1841, 1842,
1843, 1844, 1845, 1846, 1847, 1848, 1849,
1850, 1851, 1852, 1853, 1854, 1855, 1856,
1857, 1858, 1859, 1860, 1861, 1862, 1863,
1864, 1865, 1866, 1867, 1868, 1869, 1870,
1871, 1872, 1873, 1874, 1875, 1876, 1877,
1878, 1879, 1880, 1881, 1882, 1883, 1884,
1885, 1886, 1887, 1888, 1889, 1890, 1891,
1892, 1893, 1894, 1895, 1896, 1897, 1898,
1899, 1900, 1901, 1902, 1903, 1904, 1905,
1906, 1907, 1908, 1909, 1910, 1911, 1912,
1913, 1914, 1915, 1916, 1917, 1918, 1919,
1920, 1921, 1922, 1923, 1924, 1925, 1926,
1927, 1928, 1929, 1930, 1931, 1932, 1933,
1934, 1935, 1936, 1937, 1938, 1939, 1940,
1941, 1942, 1943, 1944, 1945, 1946, 1947,
1948, 1949, 1950, 1951, 1952, 1953, 1954,
1955, 1956, 1957, 1958, 1959, 1960, 1961,
1962, 1963, 1964, 1965, 1966, 1967, 1968,
1969, 1970, 1971, 1972, 1973, 1974, 1975,
1976, 1977, 1978, 1979, 1980, 1981, 1982,
1983, 1984, 1985, 1986, 1987, 1988, 1989,
1990, 1991, 1992, 1993, 1994, 1995, 1996,
1997, 1998, 1999, 2000, 2001, 2002, 2003,
2004, 2005, 2006, 2007, 2008, 2009, 2010,
2011, 2012, 2013, 2014, 2015, 2016, 2017,
2018, 2019, 2020, 2021, 2022, 2023, 2024,
2025, 2026, 2027, 2028, 2029, 2030, 2031,
2032, 2033, 2034, 2035, 2036, 2037, 2038,
2039, 2040, 2041, 2042, 2043, 2044, 2045,
2046, 2047, 2048, 2049, 2050, 2051, 2052,
2053, 2054, 2055, 2056, 2057, 2058, 2059,
2060, 2061, 2062, 2063, 2064, 2065, 2066,
2067, 2068, 2069, 2070, 2071, 2072, 2073,
2074, 2075, 2076, 2077, 2078, 2079, 2080,
2081, 2082, 2083, 2084, 2085, 2086, 2087,
2088, 2089, 2090, 2091, 2092, 209

TOP

BOUNDARY AMENDMENTS	
DOCKET NO.	DATE

Advance Sheet
Subject to Correction

LAND USE DISTRICT BOUNDARIES

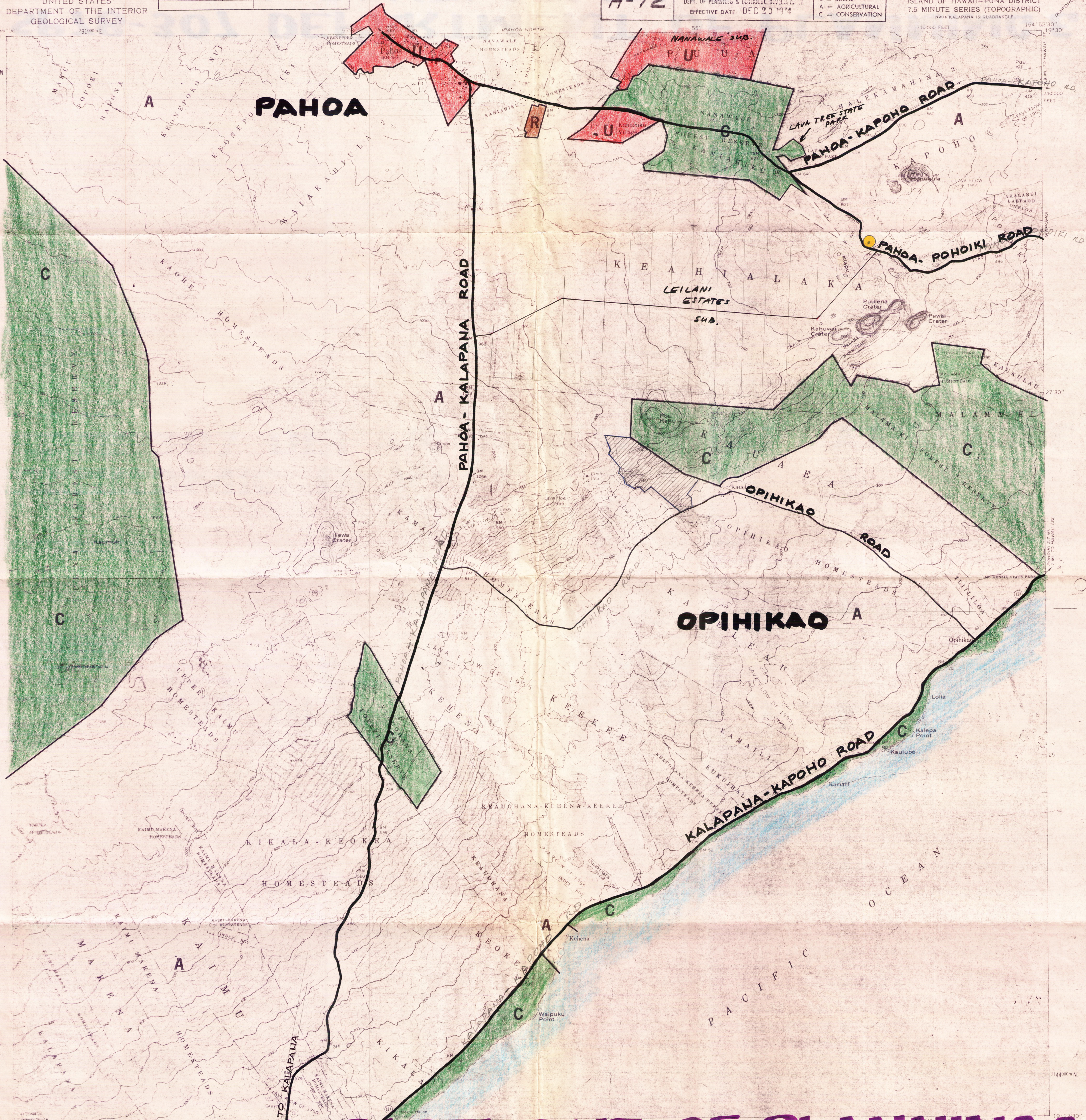
DISTRICT MAP
H-72

STATE OF HAWAII
LAND USE COMMISSION
DEPT. OF PLANNING & ECONOMIC DEVELOPMENT
EFFECTIVE DATE: DEC 23 1974

DISTRICTS
U = URBAN
R = RURAL
A = AGRICULTURAL
C = CONSERVATION

PAHOA SOUTH QUADRANGLE
HAWAII-HAWAII CO.
ISLAND OF HAWAII-PUNA DISTRICT
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 KALAPANA 15 QUADRANGLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
791000m E



SP78-307 DEPARTMENT OF PLANNING & ECONOMIC DEVELOPMENT

H-72 PAHOA SOUTH, HAWAII
NW/4 KALAPANA 15 QUADRANGLE
N1922.5-W15452.5/7.5

THIS MAP COMPLETES WITH NATIONAL MAP ACTUALLY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

1966