Hon. Star-Bulletin

6-25-90

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What Hawaii desperately needs is visionary energy planning, not destructive energy development. The amount of money already spent on research alone for the controversial underwater cable could have been used to install solar panels on every residence on Oahu. Solar and wind power, coupled with strong conservation measures, make geothermal development a poor alternative to sane energy use. Let us put our priorities where they will help the land, not destroy it. Aloha aina!

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Oahu Rainforest Action Group

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HAWAII TRIBUNE-HERALD
6-29-90

Greenpeace slams Inouye

Greenpeace and other enviro
mental groups contend that Wa
Kele is the largest remainin
expanse of lowland tropical rai

—T-H photo by Larry Kadooka

PROTESTER TOM BRENNON
... ready to stay chained 'as long as it takes'

Geothermal foes return to rain forest for protest; eight arrests reported

By Dave Harada-Stone
Tribune-Herald

WAO KELE O PUNA — Opponents of True Geothermal Co.'s development in the Puna rain forest gathered here again yesterday to vent their frustration with the project and the officials who have supported it in the face of continued community opposition.

As they have in the past, members and supporters of the Big Island Rainforest Action Group chanted, sang and got themselves arrested, all while avoiding any ugly confrontations with police or True representatives.

True workers had extended a wire fence at the gate to the company's drill site, forcing protesters to walk into the fo for some distance before cr ing onto the site. Five mad across and were detained security guards until po arrived to arrest them on t passing charges.

But police, more than a do of whom arrived late in the after being called by the sec ty guards, had first to through the gate.

Protester Tom Bren locked himself to the gate wi pair of heavy-duty bicycle lo placed around his neck.

True Geothermal work attempted to extricate Bren as police stood by. After became clear that they could

See PROTE Page 8

ROTEST: Eight arrested at Puna geo site

om Page 1

through the locks, they took ack saw to the parts of the e that the locks were ached. After more than an r of sawing, Brennon was ed, only to be taken into tody by police on obstruction rges. Also arrested were two porters who had joined Brenat the gate.

rennon, who said he had n prepared to stay chained to gate for "as long as it es," said he was angered at failure of more people — ticularly fellow native vaians — to take a stand inst geothermal.

'm tired of the fact that ryone thinks this is a hippie le situation," he said.

ne crowd of about 150 heard assioned expressions of sup- by delegates from around world who had just attended ildlife conference in Honolu-

Among them was Dave Foreman, founder of the radical environmentalist group Earth First! Foreman has been controversial because of his past advocacy of sabotage to protect the environment. Foreman made no such suggestions yesterday, but his fiery rhetoric drew enthusiastic applause from the demonstrators.

"Today is the most critical day in 3½ billion years of life on this planet," he said. "We are in the middle of World War III," a war he said pits "industrialists against the Earth and those who defend it."

Foreman called geothermal development in Wao Kele O Puna and other projects opposed by environmentalists worldwide the "Auschwitzes and Dachaus" of today, drawing an analogy between environmental devastation and the Nazi concentration camps used in World War II to kill millions of Jews and other people.

"We are the police of the earth," he said. "We are the ones trying to enforce natural law."

Annie Szcevetc of the San Francisco-based Rainforest Action Network told the protesters that their cause has been taken up by people all over the country — and the world.

She said geothermal opponents need to concentrate on the upcoming elections and get candidates for the U.S. Senate race to take a stand on the issue.

"Pressure (Rep. Pat) Saiki to take a stand; tell her her election is on the line," she said. "Pressure (Sen. Daniel) Akaka; tell him his job is on the line."

Other speakers hailed from Alaska, California, Canada, Greece and Brazil.

Geothermal proponents say the projects planned for the forest area will consume le than 1 percent of Wao Kele Puna while reducing Hawai dependence on imported o They also argue that the fore is not as pristine as others Hawaii.

Opponents, however, say t project will fragment Wao Ke which they note is the large remaining expanse of lowla tropical rain forest in the U. And they say the forest, wh maybe not pristine, is still don nated by native plants, many which are found nowhere else the world.

They noted the weeds growi along the side of the road carv to True's site, some growing feet high. By the end of the da the gate guarding the entran to the site was festooned wi hundreds of the weeds, pull from the ground by protestе and shoved into the wire fence

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Geothermal protest arrests

Eight at Pahoa demonstration; 1 at Pohoiki

By Hugh Clark
Advertiser Big Island Bureau

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A Puna community leader was arrested and charged Saturday in a protest at another site in Pohoiki. More than 200 people have been arrested in Big Island anti-geothermal-power protests since October.

The protests were organized by the Big Island Rainforest Action Group, which opposes all geothermal-power developments in the state.

Another demonstration is planned for today at Puna District Courthouse in Keaau, where some of the 39 people arrested Dec. 14 are to go on trial.

Police said most of those arrested yesterday were to be charged with simple trespass counts — a violation.

Police said those arrested were held at the site for several hours before being driven by van to Keaau for processing.

On Saturday, Robert Petricci of Leilani Estates was arrested and charged with trespassing while trying to place a flag on top of a drilling rig at the Ormat Energy Systems site at Pohoiki.

His flag featured a skull and crossbones with the words "Death Zone, No Prisoners." Petricci, 34, is vice president of a community group opposing geothermal development.

Police took him to Keaau for booking and released him on his own recognizance. He is scheduled for a July 17 appearance in Puna District Court to answer the charge.

Petricci's flag was aimed at the University of Hawaii's Scientific Observation Hole project. The UH is using Ormat-controlled land for one of its four exploratory wells to determine the extent of the Puna geothermal source.

Petricci last week was found not guilty of trespassing charges stemming from a Dec. 14 arrest at the True drilling site. He also has taken out nomination papers to run for the Hawaii County Council, saying he will run if no other anti-geothermal candidate surfaces by today's filing deadline.

Mayor urged to overrule Kim

Ormat argues the wording of its permit as well as state and county laws governing the civil defense hierarchy in Hawaii County give Mayor Larry Tanimoto — and not Civil Defense boss Harry Kim — the final say over Ormat's plan.

By Dave Harada-Stone
Tribune-Herald

The developer of the Puna Geothermal Venture project is urging Mayor Larry Tanimoto to overrule Civil Defense Administrator Harry Kim and approve an emergency response plan submitted in connection with the project.

In a letter last week to Tanimoto, Ormat Energy Systems regional development manager Maurice Richard suggested the wording of Ormat's permit as well as state and county laws governing the civil defense hierarchy in Hawaii County give Tanimoto — and not Kim — the final say over Ormat's plan.

And if Tanimoto won't step in and approve the plan, Richard says, then he should step aside and let the state's civil defense director approve it.

The county administration is holding firm, insisting that Kim — and Kim alone — will make the decision.

At issue is a response plan — required under the terms of Ormat's geothermal resource permit from the county Planning Commission — to deal with any emergencies that might arise at the 25-megawatt geothermal power plant Ormat plans to build in Pohoiki.

Kim has so far refused to approve the plan as submitted by Ormat. He is objecting to several provisions, including the levels of hydrogen sulfide — a noxious gas generated in geothermal development — and noise at which an emergency should be deemed to exist. The state Department of Health has also suggested the levels be changed, arguing that an emergency would exist at a hydrogen sulfide concentration half that proposed by Ormat.

Richard says the resulting delays are costing the company about $10,000 a day as drilling contractors and other personnel wait to begin work on the $100 million project.

The permit conditions require that the plan be approved by the county's civil defense director.

See GEO PLANT, Page 8

GEO PLANT: Administration stands by Harry Kim

From Page 1

Ask just about any Big Islander who the civil defense director is and the response will invariably be Kim, the man Big Islanders turn to for guidance in dealing with everything from lava flows to flooding.

But that's not how Ormat sees it.

In his letter, Richard notes that the state statute providing for the operation of civil defense agencies in the four counties holds that the head of each agency shall be a deputy director of the state Civil Defense Agency appointed by the director of the state agency with the concurrence of the county's council.

The Hawaii County Code identifies the mayor as the deputy director of state civil defense for the Big Island unless a full-time deputy director is appointed. The civil defense administrator, currently Kim, is to act as the chief administrative assistant to the deputy state director, namely the mayor.

Richard himself notes that the County Code also states, however, that the civil defense administrator shall "within the delegated scope of authority, have all the duties and responsibilities of the deputy director (the mayor) subject to the control of the deputy director or his successor."

Nonetheless, Richard told Tanimoto, "the highest position in this county's Civil Defense organization is held by you as a deputy director of the state Civil Defense Agency."

"However," he added, "if it is your position that you are not the director of the Hawaii Civil Defense Agency, we request you take immediate steps to refer this critical matter ... to the director of the state Civil Defense Agency, Adjutant Gen. Alexis Lum."

Tanimoto is on the mainland on a combination business trip and vacation. Managing Director Susan Labrenz said Friday that the mayor has "punted" the matter to her in his absence, and "I have decided that only Harry Kim will approve the plan."

Labrenz said she is convinced Kim's concerns are reasonable and that the intent of the Planning Commission in approving the conditions in the permit was to have Kim sign off on the emergency response plan.

County Planning Director Duane Kanuha said he has checked with a couple of the commissioners as well as participants in the mediation sessions that preceeded the permit approval and all said their understanding was that Kim would have the authority to approve the emergency response plan.

As submitted by Ormat, the plan would trigger an emergency response whenever hydrogen sulfide concentrations reach 20,000 parts per billion at the project's boundary or when noise levels reach 80 decibels.

But Kim notes that state and county permits for the project limit the increase in hydrogen sulfide levels from the plant during normal operation to five parts per billion and require notification whenever the levels at the project boundary exceed 100 parts per billion.

The county permit also limits noise levels from power plant and well field operations to 55 decibels during the day and 45 decibels at night.

In a June 14 letter to Ormat outlining his objections to the plan, Kim said the plan must indicate that "a potential emergency/disaster exists anytime conditions exceed those established" by the state Department of Health permit.

Ormat contends there is a difference between the hydrogen sulfide levels that might constitute a nuisance — most people can smell the gas at concentrations as low five parts per billion, well below harmful levels — and those levels that constitute an emergency.

But state health officials also take issue with Ormat's numbers.

In an April 7 letter to Kim, state Health Director John Lewin recommended the plan provide for three "action levels" for hydrogen sulfide.

Under Lewin's proposal, concentrations in excess of 100 parts per billion would constitute an alert level. According to Lewin, the figure is based on the level known to induce eye irritation, a short-term effect, with a 100-fold safety factor.

Lewin said a "warning" level of 1,000 parts per billion would signal further deterioration in air quality and the need for additional abatement and would fall between the level at which short-term effects occur and that at which a serious threat to public health exists.

The DOH "emergency" level would be 10,000 parts per billion, the ceiling used by the National Institute for Occupational Safety and Health for workers exposed to hydrogen sulfide.

"This is the concentration ... to which it is believed that nearly all humans may be exposed in the working environment day after day (over an eight-hour period) without adverse health effects." Lewin wrote. "Those who are hypersensitive to hydrogen sulfide, including the aged, infants, individuals with predisposing eye and respiratory problems and those who are anemic, may be adversely affected at lower levels."

In his letter to Ormat, Kim also requests the inclusion of maps illustrating worst-case scenarios for "any and all" emergency situations and a section on dealing with geothermal emergencies arising from earthquakes, eruptions, magma intrustions and other natural and mandmade disasters.

Labrenz, meanwhile, pointed out that the emergency response plan is not the only hurdle remaining before Ormat can begin work on the project.

She noted, and Kanuha confirmed, that the developer has yet to satisfy six other conditions that must be met before obtaining final plan approval from the Planning Department. While some of the conditions simply require that lists or guidelines be filed with the county, others call for such things as preparation and county approval of a ground water monitoring plan and a landscaping and siting plan.

Also required is publication of a phone number for residents to lodge complaints or inquiries with regard to the power plant's operations.

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5/8/89

HAWAII ADMINISTRATIVE RULES

TITLE 13
DEPARTMENT OF LAND AND NATURAL RESOURCES

SUB-TITLE 7. WATER AND LAND DEVELOPMENT

Chapter 185
Rules of Practice and Procedure for
Geothermal and Cable System Development Permitting

Subchapter 1. General

Section 13-185-1	Purpose
Section 13-185-2	Definitions
Section 13-185-3	Transfer of functions
Section 13-185-4	Consolidated permit application and review process
Section 13-185-5	Contested case provisions
Section 13-185-6	Streamlining
Section 13-185-7	Information services
Section 13-185-8	Annual Report

Subchapter 2. Consolidated permit application and review process

Section 13-185-9	Application and review procedure
Section 13-185-10	Application filing and fees
Section 13-185-11	Interagency group
Section 13-185-12	Consolidated permit application and review team
Section 13-185-13	Joint agreement
Section 13-185-14	Conflict resolution process

Subchapter 3. Regulation of consolidated geothermal and cable system development permitting

Section 13-185-15	Monitoring and enforcing applicant's compliance with terms and conditions of permits

Subchapter 1. General

Section 13-185-1 Purpose. The purpose of this chapter is to establish guidelines and procedures for consolidated geothermal and cable system development permitting. Consolidated permitting procedures are intended to coordinate and streamline permitting requirements of the diverse array of federal, state, and county land use, planning, environmental, and other related laws and regulations that affect geothermal and cable system development. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-2)

Section 13-185-2 Definitions. As used in this chapter: "Agency" means any department, office, board, or commission of the State or a county government which is a part of the executive branch of that government, but does not include any public corporation or authority that may be established by the legislature for the purposes of geothermal and cable system development.

"Applicant" means any person who, pursuant to statute, ordinance, rule, or regulation, requests approval or a permit for a geothermal and cable system development project.

"Approval" means a discretionary consent required from an agency prior to the actual implementation of a geothermal and cable system development project.

"Conflict" means a procedural disagreement between or among agencies as a result of conflicting permit, approval, or other requirements, procedures, or agency perspectives, not based on statute, ordinance, or rule established pursuant thereto, but based on administrative interpretation outside of statutory authority.

"Consolidated permit application form" means a package of forms comprising the form made for this purpose by the department of land and natural resources plus the forms of whatever federal and other agencies have permitting authority over a particular project and are required to use their own application form. Information provided in this package includes but is not limited to information identifying the applicant, the landowner, the location of the proposed geothermal and cable system development project, the types of permits required, environmental requirements, information on the geographic location of the project, a description of the proposed project, and plan information.

"Department" means the department of land and natural resources or any successor agency.

"Discretionary consent" means a consent, sanction, or recommendation from an agency for which judgement and free will may be exercised by the issuing agency, as distinguished from a ministerial consent.

"Environmental impact statement" means, as applicable, an informational document prepared in compliance with chapter 343, Hawaii Revised Statutes, or with the National Environmental Policy Act of 1969 (Public Law 91-190).

"Geothermal and cable system development project" or "project" means the commercial development, construction, installation, financing, operation, maintenance, repair, and replacement, including without limitation all applicable exploratory, testing, and predevelopment activities related to the foregoing, of:

(1) a geothermal power plant or plants, including associated equipment, facilities, wells, and transmission lines, on the islands of Hawaii or Maui, for the purpose of generating electric energy for transmission primarily to the island of Oahu through the cable system; and

(2) an interisland deep water electrical transmission cable system, including all land-based transmission lines and other ancillary facilities, to transmit geothermally generated electric energy from the islands of Hawaii or Maui, to the islands of Oahu or Maui, regardless of whether the cable system is used to deliver electric energy to any intervening point.

"Interagency group" means a group comprised of representatives from county, State, and federal agencies involved in geothermal and cable system development permitting activities whose permitting functions are not transferred by Sec. 196D-10, Hawaii Revised Statutes, to the department for the purpose of consolidating the permitting process for geothermal and cable system development projects.

"Permit" means any license, permit, certificate, certification, approval, compliance schedule, or other similar document or decision pertaining to any regulatory or management program which is related to the protection, conservation, use of, or interference with the natural resources of land, air, or water in the State and which is required prior to or in connection with the undertaking of the project.

"Person" includes any individual, partnership, firm, association, trust, estate, corporation, joint venture, consortium, any public corporation or authority that may be established by the legislature for the purposes of the project, or other legal entity other than an agency.
[Eff:] (Auth: HRS Sec. 196D-9)
(Imp: HRS Secs. 196D-3, HRS 196D-6)

Section 13-185-3 Transfer of functions. The following functions are transferred to the department: the functions of the land use commission related to district boundary amendments as set forth in section 205-3.1 et seq., Hawaii Revised Statutes; and functions of the land use commission related to changes in zoning as set forth in section 205-5, Hawaii Revised Statutes; and permit approval and enforcement functions of the department of transportation related to use of or commercial activities in or affecting the ocean waters and shores of the State under chapter 266, Hawaii Revised Statutes.

(a) Regarding functions of the land use commission related to district boundary amendments as set forth in section 205-3.1 et seq., Hawaii Revised Statutes, for district boundary amendments involving land areas greater than fifteen acres, and for land areas fifteen acres or less in conservation districts, as they relate to a geothermal and cable system development project, the department shall process applications as follows. The applicant shall file a petition for boundary amendment with the department. The petition shall be in writing and shall provide a statement of the authorization or relief sought; the statutory provisions under which authorization or relief is sought; for petitions to reclassify properties from the conservation district to any other district, the petition shall include an environmental impact statement or negative declaration approved by the department for the proposed reclassification request; the legal name of the petitioner, and the address, description of the property, the petitioner's proprietary interest in the property, and a copy of the deed or lease, with written authorization of the fee owner to file the petition; the petition shall include the type of development proposed and details regarding the development including timetables, cost, assessment of the effects of the development, and an assessment of the need for reclassification. The department shall serve copies of the application upon the county planning department and planning commission within which the subject land is situated, upon the director of the department of planning

and economic development, or a designated representative, and upon all persons with a property interest in the property recorded in the county's real property tax records at the time the petition is filed, along with a notice of a public hearing on the matter, to be conducted on the appropriate island. The department shall set the hearing within not less than sixty and not more than one hundred eighty days after a proper application has been filed. The department shall also mail notice of the hearing to all persons who have made a timely written request for advance notice of boundary amendment proceedings, and notice of the hearing shall be published at least once in a newspaper in the county in which the land sought to be redistricted is situated as well as once in a newspaper of general circulation in the State at least thirty days in advance of the hearing. The notice shall comply with the provisions of section 91-9, shall indicate the time and place that maps showing the proposed district boundary may be inspected, and further, shall inform all interested persons of their rights regarding intervening in the proceedings. The department shall appear at the proceedings as a party in the petition and shall make recommendations relative to the proposed boundary change. The department shall admit any other department or agencies of the State and of the county in which the land is situated as parties upon timely application. The department shall admit any person who has some property interest in the land, who lawfully resides on the land, or who otherwise can demonstrate that they will be so directly and immediately affected by the proposed change that their interest in the proceeding is clearly distinguishable from that of the general public, as parties for intervention to the proposed boundary change. The department shall receive applications for leave to intervene from any member of the public. However, the department shall deny an application if it appears it is substantially the same as the position of a party already admitted to the proceeding or if admission of additional parties will render the proceedings inefficient and unmanageable. The petition for intervention shall be filed with the department within fifteen days after the notice of hearing is published in the newspaper. The petition shall make reference to the following:

(1) Nature of petitioner's statutory or other right;

(2) Nature and extent of the petitioner's interest, and if an abutting property owner, the tax map key description of the property;

(3) Effect of any decision in the proceeding on petitioner's interest.

Within a period of not more than one hundred and twenty days after the close of the hearing, the department shall, by findings of fact and conclusions of law, act to approve the petition, deny the petition, or to modify the petition by imposing conditions necessary to uphold the intent and spirit of the law or to assure substantial compliance with representations made by the petitioner in seeking a boundary change.

(b) Regarding transfer of the function of the land use commission concerning changes in zoning, the department shall review and consider issuing special permits as necessary in connection with applications for geothermal and cable system development projects on land zoned for agriculture and within rural districts. Such special permits may be issued at the department's discretion upon favorable review of the purpose of the request.

(c) Regarding permit approval and enforcement functions of the department of transportation related to use of or commercial activities in or affecting the ocean waters and shores of the State under chapter 266, Hawaii Revised Statutes, for any construction, dredging, or filling within the ocean waters of the State, including ocean waters, navigable streams and harbors belonging to or controlled by the State, to be undertaken as part of a geothermal and cable systems development project, a permit application form called "Application for Work in the Ocean Waters of the State of Hawaii", available at the Division of Water and Land Development, shall be filed by the applicant. Requirements to accompany the application include an environmental assessment or statement, a description of the shoreline, nature and extent of proposed work (such as construction, dredging, disposition of dredged material, filling, or other work), reference to public access, effects on adjacent property owners, and other information pertinent to the proposed work as required. In areas where a Conservation District Use Application (CDUA) is required, the Application for Work in the Ocean Waters of the State of Hawaii need not be filed. The requirements outlined above will be met via inter-division coordination within the department. A separate application for permit for work in the shorewaters of the State will no longer be necessary except when: (1) applicant's proposal is in the conservation district, but does not require a CDUA per the department's determination and (2) applicant applies for

CDUA, but in the review process the department expresses opposition or objection to the proposal. In areas where the proposed project is in the ocean waters, but not in the conservation district, the applicant is required to file with the department. The department shall inform and consult with, as appropriate, various agencies that have jurisdiction over navigable waters. When directed, the applicant shall notify the United States Coast Guard of such work for publication of a "Notice to Mariners". [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-10)

Section 13-185-4 Consolidated permit application and review process. In order to carry out the intent of the geothermal and cable system development permitting act of 1988, the department shall establish and administer a consolidated permit application and review process as provided in this chapter. The consolidated permit application and review process shall not affect or invalidate the jurisdiction or authority of any agency under the existing law, except to the extent that permitting functions have been transferred to the department for the purposes of the project, and each federal agency shall isssue its own permit or approval based on its own jurisdiction. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-5)

Section 13-185-5 Contested case provisions. Where the contested case provisions under chapter 91, Hawaii Revised Statutes, apply to any one or more of the permits to be issued by an agency for the purposes of the project, the agency may, if there is a contested case involving any of the permits, be required to conduct only one contested case hearing on the permit or permits within its jurisdiction. Any appeal from a decision made by the agency pursuant to a public hearing or hearings required in connection with a permit shall be made directly on the record to the supreme court for final decision subject to chapter 602, Hawaii Revised Statutes. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-5)

Section 13-185-6 Streamlining. The department shall monitor the processing of all permit applications under this chapter on an ongoing basis to identify inefficiencies, delays, and duplications of effort. The department shall track the status of permits of those agencies whose permitting functions are not transferred to the department for the purpose of consolidated permitting

for geothermal and cable system development projects. Any alternative suggestions and recommended changes in procedures will be brought to the interagency group as appropriate for consideration and adoption. The department may develop legislative proposals as appropriate to eliminate any duplicative or redundant permit requirements. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-7)

Section 13-185-7 Information services. (a) The department shall operate a permit information and coordination center that will provide guidance to potential applicants for geothermal and cable system development projects with regard to permits and procedures that may apply to the project. The center shall be known as the geothermal and cable system development permitting information and coordination center.

(b) The department shall maintain and update at the geothermal and cable system development permitting information and coordination center a repository of the laws, rules, procedures, permit requirements, and criteria of agencies whose permitting functions are not transferred to the department for the purpose of consolidated permitting and which have control or regulatory power over any aspect of geothermal and cable systems development projects and of federal agencies having jurisdiction over any aspect of these projects. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-8)

Section 13-185-8 Annual report. The department shall submit an annual report to the governor and the legislature on its work during the preceding year. The report shall include the status of geothermal and cable system development projects, any problems encountered, any legislative actions that may be needed to improve the consolidated permit application and review process, and to implement the intent of the geothermal and cable system development act of 1988. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-11)

Subchapter 2. Consolidated permit application and review procedures

Section 13-185-9 Application and review procedure. (a) The department shall provide the applicant with a geothermal/cable development consolidated permit application form. The consolidated permit application

form will be available during office hours 7:45 a.m. to 4:30 p.m. Monday through Friday, except holidays, at the following address:

Department of Land and Natural Resources
Division of Water and Land Development
1151 Punchbowl Street, Room 227
Honolulu, Hawaii 96813
Telephone: 548-7533
Telefax: 548-6052

The department shall provide necessary assistance for the applicant to fill out the consolidated geothermal/cable development application form.

(b) The department shall provide advice to any applicant when federal and other agencies have indicated that they will not participate in the consolidated permit application and review process. The department shall assist the applicant in applying directly to these agencies, and shall coordinate to the fullest extent possible the consolidated permitting process with the permitting processes of the non-participating federal and other agencies.

(c) Upon receipt of the properly completed consolidated permit application, the department shall notify all State and county agencies whose permitting functions are not transferred to the department for the purpose of geothermal/cable system development permitting, as well as all federal agencies that may have jurisdiction over any aspect of the proposed project as set forth in the application, and shall invite the federal agencies and shall require State and county agencies so notified to participate in the consolidated permit application and review process. [Eff:]
(Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-5)

Section 13-185-10 Application filing and fees. The applicant shall attach to the consolidated permit application form a preliminary statement of project costs. A filing fee varying with the statement of project cost shall accompany the consolidated permit application as follows:

Project Cost	Fee
$0 - 999,999	$200
1,000,000 - 9,999,999	$400
more than 10,000,000	$600

The fee shall be payable by check which shall accompany the application and should be made payable to the State of Hawaii. The check and the geothermal/cable development consolidated application shall be submitted to:

State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96806

or delivered to:

Department of Land and Natural Resources
Division of Water and Land Development
1151 Punchbowl Street, Room 227
Honolulu, Hawaii 96813

Checks for filing fees required for filing applications with agencies participating in the consolidated permit application and review process but whose permitting functions have not been transferred to the department for the project shall be made out in separate amounts to the respective agencies but shall be attached to the consolidated permit application form.

Filing fees for federal and other agencies not participating in the consolidated permit application and review process shall be submitted directly to those agencies. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-5)

Section 13-185-11 Interagency group. In order to provide coordination amongst agencies to facilitate carrying out the consolidated permit application and review process, the department shall convene an interagency group comprised of representatives of federal and other permitting agencies whose permitting functions have not been transferred to the department including but not limited to the following:

U.S. Army Corps of Engineers
District Engineer (POD CO-O)
Building 230
Fort Shafter, Hawaii 96858

Commander in Chief
U.S. Pacific Fleet
Pearl Harbor, Hawaii 96860

Commander, U.S. Coast Guard
Fourteenth Coast Guard District (OAN)
300 Ala Moana Boulevard, Room 9153
Honolulu, Hawaii 96850

District Chief,
Water Resources Division
U.S. Geological Survey
300 Ala Moana Boulevard, Room 6110
Honolulu, Hawaii 96850

Pacific Islands Administrator
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 5302
P.O. Box 50167
Honolulu, Hawaii 96850

National Marine Fisheries Service
Pacific Islands Coordinator
2570 Dole Street, Room 106
Honolulu, Hawaii 96822-2396

Environmental Protection Agency
Manager,
Pacific Islands Contact Office
300 Ala Moana Boulevard, Room 1302
Honolulu, Hawaii 96850

Pacific Area Director
National Park Service
300 Ala Moana Boulevard, Room 6305
Honolulu, Hawaii 96850

State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

State of Hawaii
Office of State Planning
State Capitol, Room 410
Honolulu, Hawaii 96813

State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, Hawaii 96813

State of Hawaii
Department of Business and
Economic Development
250 South King Street
Honolulu, Hawaii 96813

Mayor, County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96721

Mayor, County of Maui
200 South High Street
Wailuku, Hawaii 96783

Mayor, City and County of Honolulu
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

State and county agencies having permitting authority in geothermal and cable systems development projects shall participate in the activities of the interagency group. Federal agencies with permitting authority are invited to participate and the department shall give them the fullest cooperation possible in coordinating federal and State permit requirements.

If the legislature establishes any public corporation or authority for the purposes of implementing geothermal and cable systems development projects, then upon its establishment, the public corporation or authority shall be a member of the interagency group. The department shall convene meetings of the interagency group as required, and in appropriate locations, to organize to participate and to participate in the consolidated permit application and review process. The department shall convene a meeting of the interagency group in a timely manner upon completion of the department's review of each properly completed geothermal/cable consolidated permit application.[Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-6)

Section 13-185-12 Consolidated permit application and review team. (a) The department shall select a working team known as the consolidated permit application and review team from among representatives of agencies having jurisdiction over any aspect of the project. The applicant shall designate a representative to be available to the consolidated application and review team for

purposes of processing the applicant's consolidated permit application. The consolidated application and review team shall work with the department to provide permitting coordination for each geothermal and cable system development project. The team shall consolidate the various permitting requirements for each project.

(b) The department and agencies, through the consolidated permit application and review team, shall cooperate with the federal agencies to the fullest extent possible to minimize duplication and where possible promote consolidation of federal and State requirements. To the fullest extent possible, this cooperation shall include joint environmental impact statements with concurrent public review and processing at both levels of government. Where federal law has requirements that are in addition to but not in conflict with State law requirements, the department and the agencies shall cooperate to the fullest extent possible in fulfilling those requirements so that all documents shall comply with all applicable laws. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Secs. 196D-5, 196D-6)

Section 13-185-13 Joint Agreement. Representatives of the State and county agencies participating on the consolidated application and review team shall sign a joint agreement committing them to meet and perform the following tasks for each project application:

(1) provide a listing of all permits required for the proposed project;
(2) specify the regulatory and review responsibilities of the department and each State, county, and federal agency and the responsibilities of the applicant;
(3) provide a timetable for regulatory review, the conduct of necessary hearings, preparation of an environmental impact statement, if necessary, and other actions required to minimize duplication and to coordinate and consolidate the activities of the applicant, the department, and the State, county, and federal agencies; the timetable shall accommodate existing statutes, ordinances, or rules established pursuant thereto, of each participating agency so that if one participating agency requires more time than another agency to process its portion of the consolidated permit application and cannot move up its schedule, the consolidated process shall defer to the agency with the longer time requirement.

(4) coordinate hearings required for a permit, and hold hearings on the island where the proposed activity shall occur;
(5) prepare alternatives for resolving conflicts and bring these to the affected agencies for resolution and if none of these alternatives is satisfactory to resolve a conflict, follow the conflict resolution process in section 13-185-14;
(6) approve a consolidated permit compliance monitoring program and schedule prepared by the department to take effect after a proposed project is approved, to be monitored by the department;
(7) provide that each agency shall monitor and enforce the respective terms and conditions of each agency's respective permits.

Federal agencies are invited to sign the joint agreement for a period not to exceed the term of the entire process for each geothermal and cable system development project application submitted to the department. Signing the joint agreement and thereby participating in the consolidated application process shall not affect or invalidate the jurisdiction or authority of any agency under existing law. Each agency shall issue its own permit or approval based on its own jurisdiction. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-4)

Section 13-185-14 Conflict resolution process. Should administrative or procedural conflicts arise that the consolidated permit application and review team cannot resolve, the following conflict resolution process shall be implemented:

(a) in a conflict between State departments, any affected State department head may declare that an impasse exists between that department and any department or departments of the State during any phase of the permitting process related to the geothermal and cable systems development project. The applicant may also seek an impasse declaration by filing in writing with the administrative director of the State that such a declaration should be issued if the processing of a permit application has not made significant progress for forty-five calendar days. The administrative director shall make the determination whether an impasse declaration should be made. Upon an impasse being declared, the involved department heads shall each submit a report in writing to the administrative director within ten calendar days from the date of the impasse declaration.

The reports shall list the chronological events leading to the impasse, the perceived causes of the impasse, and a suggested solution. The administrative director or the administrative director's designee shall meet with the involved directors within twenty calendar days from the impasse declaration date. Should the impasse still exist following this meeting, the administrative director shall report to the governor the latest position of the directors and a recommendation. Upon a decision of the governor resolving the impasse, the involved departments shall intiate implementing the governor's decision within three calendar days from the date of the final decision.

(b) in a conflict between State and county agencies, any State or county department head involved in processing an application related to the geothermal/cable project can declare that an impasse has developed between the involved county and State departments.

Such a declaration shall be in writing identifying the unresolved issues and the respective positions of the affected departments. The applicant may also seek an impasse declaration by filing a written request with the administrative director of the State or the county agency which shall be designated by the mayor. Such a request for impasse declaration may be made if the processing of a permit application has not made significant progress for forty-five calendar days. Unless objected to in writing by the reviewing county and State department or State departments, an impasse declaration shall be made within ten working days from the date that the request for impasse declaration was filed. Upon an impasse being declared, the affected State and county department heads shall each submit a report in writing to both the State administrative director and the designated county agency within ten days from the date of impasse declaration. The reports shall list the chronological events leading to the impasse, the perceived causes of the impasse, and a suggested solution. The administrative director or the administrative director's designee and the head of the mayor's designated county agency or that agency's designee, shall meet with the involved State and county department heads within twenty calendar days from the impasse declaration date. Should the impasse declaration still exist following the meeting, the administrative director shall render a decision. The involved State and county departments shall initiate implementing the administrative director's decision within three calendar days from the date of the final decision.

[Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-4)

Subchapter 3. Regulation of Geothermal and Cable System Development Permitting

Section 13-185-15 Monitoring applicants' compliance with terms and conditions of permits. Once a geothermal and cable systems development consolidated permit application has been approved by the review team, the department shall commence monitoring the applicant's compliance with the terms and conditions of the permits for which the department has full and direct responsibility, including those issued pursuant to functions transferred to the department by section 196D-10, Hawaii Revised Statutes. The department shall prepare a schedule for monitoring terms and conditions of consolidated permits that shall be accepted by the consolidated permit application and review team. The department shall monitor permitting agencies' monitoring activities to assure permit compliance is being monitored. The monitoring schedule will identify terms and conditions of compliance, dates of monitoring, federal and other agencies and individuals who shall carry out the monitoring activity, and the date the report of the monitoring activity shall be sent to the department. The department shall maintain a log of the monitoring activities and shall alert the appropriate permitting agency if monitoring for permit compliance is not being carried out on schedule. If necessary the department in conjunction with the affected agency or agencies shall enforce all terms and conditions related to any permit. [Eff:] (Auth: HRS Sec. 196D-9) (Imp: HRS Sec. 196D-5)

WRM

1391

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:

June 8, 1990

Major General Alexis T. Lum
Office of the Adjutant General and
Director of Civil Defense
Department of Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816

Dear Major General Lum:

The attached letter to the Big-Island Civil Defense Coordinator is written to offer assistance in developing logical and appropriate plans for emergency response with respect to geothermal development on the Big-Island.

We hope these comments will be helpful in responding to the plans in this regard in a timely manner.

Please don't hesitate to contact my office if the Department can further assist in this matter.

Sincerely yours,

JOHN C. LEWIN, M.D.
Director of Health

c: Governor John Waihee
Sus Ono

bc: Dr. Joshua Agsalud
Charles Freedman
The Honorable Roger Ulveling
✓The Honorable William W. Paty
Dr. Bruce Anderson
Mark Ingoglia

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

7 June 1990

In reply, please refer to:
HEER OFFICE

Mr. Harry Kim, Chairman
Hawaii Local Emergency Planning Committee
34-A Rainbow Drive
Hilo, Hawaii 96720

Subject: Review of the Puna Geothermal Venture 25 MW Power Project Emergency Response Plan

Dear Mr. Kim:

Thank you for the opportunity to review the Puna Geothermal Venture 25 MW Power Project Emergency Response Plan. The plan includes a reasonable review of the potential hazards that maybe posed by the project. The following comments and recommendations are offered to improve and enhance the document. If these comments and recommendations are fully implemented on a consistent basis while the facility is constructed and operated, public and private interests should be prepared for the emergencies that may arise or affect the proposed development.

Notification

The 24 hour notification number for the Department of Health Clean Air Branch for emergency response is 247-2191, and should be included in Table 2-1, page 8. Department of Land and Natural Resources should replace Lands and Natural Resources. The National Response Center in Washington D.C., phone number (800) 424-8802, should be included for a federal response. Due to mining exemptions we are unclear if isopentane releases are required to be reported under the federal Superfund law. This should be determined by the applicant and reportable quantities listed at appropriate locations in the plan. If regulated, follow-up written release reporting under Section 304 of Title III is required. If the mining exemption does apply, we recommend requiring notification of releases similar to the federal Superfund in the plan.

Emergency and Nuisance Situations

Under Section 3.1 Emergency conditions, page 11, you have proposed that an emergency condition exists when H_2S levels reach 20 parts per million (ppm) at the property boundary, however this action level is inconsistent with the levels the state is proposing.

The Department of Health has proposed action levels for H_2S including "alert", " warning", and "emergency" levels. The rationale for the establishment of these action levels and actions called for is as follows:

1. The Alert level is that concentration of (H_2S) at which short-term health effects can be expected to occur.

Recommendation: 0.10 ppm (100 parts per billion) H_2S (over a one-hour averaging period).

Rational: In light of the available literature, a maximum ambient standard of H_2S of 0.10 ppm is safe from a toxic effect standpoint. It follows that deleterious physiologic health effects may begin to occur at levels above 0.10 ppm among those most susceptible. This number was based on the lowest level well-documented to be associated with human eye irritation, a short -term effect, with a one hundred-fold safety factor included.

2. The warning level indicates that air quality is continuing to deteriorate and that additional abatement actions are necessary.

Recommendation: 1.00 ppm H_2S (over a one-hour averaging period).
Rational: This level is between that at which short-term health effects can be expected to occur (0.10 ppm H_2S) and that at which a substantial endangerment to human health can be expected (10.0 ppm H_2S).

3. The Emergency level is that level at which a substantial endangerment to human health can be expected.

Recommendation: 10.0 ppm H_2S (over a one-hour averaging period).
Rational: Eye irritation and decreased corneal reflex have been well documented to be associated with levels of exposure above 10.0 ppm H_2S. Lung damage may also be occurring at this level but is difficult to detect.

The U.S. National Institute for Occupational Safety and Health maintains an allowable ceiling concentration of 10.0 ppm for 10-minutes is safe. It may be inferred from this that any exposure above 10.0 ppm is unsafe. Immediate evacuation of a facility is required if the concentration of H_2S at any time exceeds 47 ppm O.S.H.A.

The American Conference of Governmental Industrial Hygienists also recommends the "Threshold Limit Value" to be 10 ppm H_2S. This is the concentration of H_2S to which it is believed nearly all humans may be exposed in the working environment day after day (over an 8-hour exposure period) without adverse health effects. Those who are hypersensitive to H_2S, including the aged, infants, individuals with predisposing eye and respiratory problems, and those who are anemic, may be adversely affected at lower levels.

Thus, in reviewing the literature, it may be concluded that levels of exposure above 10.0 ppm pose a substantial endangerment to human health. The plan should discuss fully the use of these levels and integrate them into the planning and response mechanism of the plan.

Response Facilities

All response and safety facilities, as well as general grading in the area should be constructed to ensure that they will not serve to capture H_2S in a depression and thereby cause a hazard. Table 4-1 indicates that there are 12 "air packs". The type of self contained breathing apparatus and their air capacity should be included. Air monitoring devices should also be listed. Portable real time monitors should be available along with the "air packs" and should be described.

PGV Personnel Training and Emergency Drill

As cited on page 27, OSHA training will be provided. This should be described, and if possible a draft training plan should be attached to the emergency response plan as an appendix or addendum. A description of a "general drill" should be included to provide insight into what such an exercise will provide and it's value.

Uncontrolled Steam Releases from the Reservoir

A worst case well blow out has been modeled, "...under any weather conditions typical of the site vicinity. " This term should be defined and related to planning for "untypical" weather conditions; a reasonable "worst case scenario" should be included in the risk analysis and should include, but not be limited to methods described in the following guidance:

U.S. Environmental Protection Agency, Federal Emergency Management Agency, U.S. Department of Transportation (1987) Technical Guidance for Hazards Analysis: Emergency Planning for Extremely Hazardous Substances.

Federal Emergency Management Agency, U.S. Department of Transportation, U.S. Environmental Protection Agency (1987) Handbook of Chemical Hazard Analysis Procedures.

It is recommended that upon the occurrence of an uncontrolled release, the Hawaii Civil Defense Agency and the Department of Health should be notified immediately and periodically updated. Other reporting requirements are specified in the permits issued by the Department of Health.

We look forward to continued cooperation to improve Hawaii's capability to respond to chemical emergencies. If you have any questions regarding this review, please contact Bruce Anderson, Ph.D., Deputy Director for Environmental Health at 548-4139.

Sincerely,

JOHN C. LEWIN, M.D., Chairman,
Hawaii State Emergency Response
Commission and Director of Health

cc: Samuel Ruben, M.D., District Health Administrative Officer
Hawaii District Health Office.

COPY

May 17, 1990

90-A236
File #833

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Authority to Construct (ATC) No. A-833-795
Fourteen (14) Geothermal Exploratory/Developmental Wells

The Department of Health acknowledges receipt and has completed its review of your written notification, including the location drawing and information on the previously constructed wells. The Department hereby approves the notification of the proposed site for the construction of the first geothermal well.

It should be noted that in accordance with the Special Conditions of ATC No. A-833-795, the construction of any geothermal well is not authorized, until such time the air quality and meteorological monitoring stations are fully operational. Please inform the Department in writing upon initiating operations of the monitoring stations.

If you have any questions, please call Mr. Nolan Hirai of the Clean Air Branch at 543-8200.

Sincerely,

Bruce S. Anderson

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

NH/sk
cc: DHSA, Hawaii
Rodney Nakano, Hawaii County Planning Department
Manabu Tagomori, Department of Land & Natural Resources

April 24, 1990

Mr. Duane Kanuha
Planning Director
County of Hawaii
Planning Department
25 Aupuni Street, Rm. 109
Hilo, Hawaii 96720

Dear Mr. Kanuha:

SUBJECT: County of Hawaii, Geothermal Resources Permit No. 2
Puna Geothermal Venture
Kapoho, Puna, Hawaii
TMK: 1-4-1: part 2, 3, part 19, 58

Thank you for your letter of March 23, 1990, which enclosed the archaeological report for Condition 30 of this permit (Kennedy 1990. Archaeological Walk-Through Reconnaissance Survey for the Proposed Puna Geothermal Venture Project Site. Archaeological Consultants of Hawaii.).

We agree with the report's findings that no historic sites are present on the surface of the project area. This finding had been established in a previous historic preservation review for the project.

Given the recent findings related to the True/Mid-Pacific Geothermal area -- findings of subsurface lava caves with historic remains in them -- we believe that it would be useful for this possible presence of such caves to be considered in the archaeological survey of this project. This could be done in two ways. One, the archaeological consultant could evaluate the possiblity of caves being present through information obtained on lava terrain present, information from geologists, and information from local residents on known caves that might pass under the project. Then, if caves are unlikely to be present, this concern is eliminated. If caves were likely to be present, then planning to deal with such a situation could be done. Two, an archaeologist could be kept on call in case a tube cave was encountered, and then could check any discovered caves for cultural remains and if such remains were present could then consult with your department and our office for mitigation measures, if needed. The first approach would be best, since it would obtain an evalnation prior to subsurface drilling work.

Sincerely,

/s/ DON HIBBARD

DON HIBBARD, Director
Historic Preservation Program

RC:al 4/24/90

APR 24 1990

Civil Defense Agency

Larry S. Tanimoto
Mayor

54-A Rainbow Drive • Hilo, Hawaii 96720 • (808) 935-0031 • Fax (808) 935-6460

doc04780

TO: Duane Kanuha, Planning Director

FROM: Harry Kim, Civil Defense Administrator HK

DATE: April 20, 1990

SUBJECT: Emergency Response Plan--Puna Geothermal Venture

I have continued to work with Puna Geothermal Venture's staff to complete an acceptable Emergency Response Plan for their planned Geothermal Project at Kapoho. We are presently trying to resolve some details, however, the Civil Defense Agency's involvement at the Kalapana lava front has made coordinating our efforts more difficult.

It is my understanding that in accordance with Condition No. 26 of the Planning Commission's Geothermal Resource Permit, a final plan of action to deal with emergency situations must be approved prior to commencing any activity approved under this permit. It is my understanding that environmental monitoring equipment including the meteorological tower, the air quality and noise monitoring stations have not been installed and their installation has been delayed pending approval of the Emergency Response Plan.

It is also my understanding that this Emergency Response Plan is intended to be a living document subject to revisions and clarifications as needed and to provide a working document appropriate to respond to future natural or man-made emergencies.

In view of this, the installation of environmental monitoring equipment should be allowed to proceed without further delays caused by this office. Any other activity must await approval of the Emergency Response Plan which will be reviewed as soon as possible.

dy

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

March 16, 1990

90-A99
File #833

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Modification to Authority to Construct No. A-833-795
Fourteen (14) Geothermal Exploratory/Development Wells
Located at TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19,
Kilauea Lower East Rift Zone, Puna, Hawaii

Pursuant to Chapter 342B, Hawaii Revised Statutes, and Chapter 11-60, Hawaii Administrative Rules, the Department of Health (DOH) hereby modifies the subject Authority to Construct No. A-833-795.

The following modified special conditions supersede the corresponding special conditions of Attachment II issued with ATC No. A-833-795 dated February 6, 1990:

Special Condition No. 2

This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and approval obtained from the Department of Health prior to the commencement of construction of each well. The Department of Health shall act on the approval in a timely manner provided all required and requested information have been submitted. Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

Special Condition No. 3

The permittee shall obtain a Permit to Operate prior to any well approved under this permit being connected to and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

Special Condition No. 5

The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb (above background) and 100 ppb (including background) on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 25 ppb (above background) and 100 ppb (including background) on a one-hour average.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

Special Condition No. 9

Flaring of excess hydrogen sulfide gas from the completed wells is prohibited without the approval of the Department of Health. If flaring of the excess gas is considered necessary, the permittee must submit a written request to the Department of Health which shall include as a minimum the proposed date, time and approximate duration of the flaring episode, the current and expected well head pressure, the estimated hydrogen sulfide concentration in the well gas, the estimated emission rates for hydrogen sulfide and sulfur dioxide, an air quality impact analysis for sulfur dioxide, the probable cause of excess gas buildup, and an assessment of any abatement alternatives.

If a request to flare excess gas is approved as necessary by the Department of Health, the approval may be subject to specified conditions. These conditions may include, but are not limited to, provisions requiring the permittee to install, operate, and maintain sulfur dioxide ambient monitors and to submit to the Department of Health after the flaring event a report on the times flaring actually occurred, the sulfur dioxide emissions determined through either direct or indirect measurements, and any problems encountered during the flaring process.

Special Condition No. 11

The permittee shall have proper safety devices on-site at least three days prior to commencement of drilling operations. A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

Special Condition No. 13

The permittee shall monitor the hydrogen sulfide concentration and emission rate continuously in the steam by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to five (5.0) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

During periods of well equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The Department of Health shall be immediately notified of the well equipment failure or malfunction. If the well equipment in question cannot be repaired within twenty-four (24) hours of the occurrence or the hydrogen sulfide ambient

concentration exceeds the specified limits in Special Condition Nos. 23, 27 and 28, the permittee shall cease operations and shut-in the well in accordance with Special Condition Nos. 23, 27 and 28. Within five (5) days of the occurrence, a report shall be submitted to the Department of Health. The report shall include a description of the equipment failure or malfunction, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the repairs conducted to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule, or order which results from the well equipment failure or malfunction.

Special Condition No. 17

The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practicable. Should any releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases result in hydrogen sulfide emissions of five (5.0) pounds per hour or more, or exceed seven (7) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds seven (7) minutes in duration in any one hour, the permittee shall take immediate action to shut-in the well.

Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

Special Condition No. 22

Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for optimal dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second (8.9 miles per hour). Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum

of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

In no case shall any well venting coincide with any pipeline cleanouts, or well flow testing operations, or commence if the power plant emergency steam release facility is being utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

Special Condition No. 23

In no case shall the well drilling, flow testing, venting operations, or well equipment failure or malfunction of any of the fourteen (14) geothermal exploratory/developmental wells cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall immediately notify the Department of Health, ceasing all well drilling with aerated mud or aerated water, well flow testing, and well venting operations, and shutting in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected wellfield construction activities shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the contributions from the well drilling with aerated mud or aerated water, well flow testing, well venting operations or well equipment repair will not result in or contribute to the exceedance of the hydrogen sulfide ambient concentration of 100 ppb (including background) on a one-hour average.

The permittee shall submit to the Department of Health a written follow-up report within five (5) days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

Special Condition No. 27

During those periods of normal power plant and normal wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the

hydrogen sulfide ambient concentration in excess of 5 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report. As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.

Special Condition No. 28

Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

The following special condition of Attachment II issued with ATC No. A-833-795 dated February 6, 1990 is hereby deleted:

Special Condition No. 24

The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an

exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

All other special conditions of Attachment II (Special Condition Nos. 1, 4, 6, 7, 8, 10, 12, 14, 15, 16, 18, 19, 20, 21, 25 and 26) issued with ATC No. A-833-795 dated February 6, 1990 shall not be affected and shall remain valid.

These modifications shall become final twenty (20) days after receipt, unless before the twenty (20) days expire, Puna Geothermal Venture submits a written request to the Director of Health for a hearing pursuant to Chapters 91 and 342B, Hawaii Revised Statutes. If a hearing is requested, it will be held at a date, time, and place to be specified later and conducted in accordance with Chapter 91, Hawaii Revised Statutes, and the rules of Practice and Procedure of the Department of Health.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

WN/sk
cc: DHSA, Hawaii

COPY FOR YOUR INFORMATION

March 16, 1990
Ramseyer

ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-833-795
APPLICATION NO. A-833
WELLFIELD

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and approval obtained [with minimal delay] from the Department of Health prior to commencement of construction of each well. **The Department of Health shall act on the approval in a timely manner provided all required and requested information have been submitted.** Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

3. The [Department of Health shall act on] **permittee shall obtain** a Permit to Operate [Application] prior to any well approved under this permit being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

4. No geothermal exploratory/developmental wells shall be located within 600 feet of the property boundary. If any federal, state or county permit or order stipulates a distance greater than 600 feet in which no geothermal wells can be located, the greater distance shall so apply.

5. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

   Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide

concentrations in excess of 25 ppb **(above background)** and 100 ppb **(including background)** on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above **25 ppb (above background) and** 100 ppb **(including background) on a one-hour average.**

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

6. At the discretion of the Director of Health, the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

7. The permittee shall notify the Department of Health in writing at least two (2) working days prior to the commencement, and within two (2) working days after the completion of the aerated mud or aerated water drilling, well venting, and flow testing operations, for each geothermal well.

8. Upon completion of flow testing operations, each geothermal well shall be shut-in or otherwise prevented from discharging to the atmosphere in accordance with appropriate standards of operation and maintenance and at no time be placed on continuous or standby bleed status.

9. [Occasional flaring of excess hydrogen sulfide gas from the completed wells is prohibited unless such flaring is necessary to insure well integrity or safety and is conducted in such a manner that no state or national ambient air quality standards for sulfur dioxide are exceeded. Records shall be maintained on all flaring episodes, and shall include, as a minimum, the date, time and duration of the event, probable causes of the excess gas buildup, and the estimated emissions of sulfur dioxides determined through either direct or indirect measurements. The records shall be in a permanent form suitable for inspection and shall be retained for at least three (3) years following the date of such records. The permittee shall submit a written report monthly to the Department of Health on the flaring episodes which demonstrates compliance with the requirements of this condition. If flaring occurs frequently or routinely, the permittee shall install, operate, and maintain ambient sulfur dioxide monitors at each air quality monitoring station and comply with all recordkeeping requirements in accordance with Special Condition No. 5.]

Flaring of excess hydrogen sulfide gas from the completed wells is prohibited without the approval of the Department of Health. If flaring of the excess gas is considered necessary, the permittee must submit a written request to the Department of Health which shall include as a minimum the proposed date, time and approximate duration of the flaring episode, the current and expected well head pressure, the estimated hydrogen sulfide concentration in the well gas, the estimated emission rates for hydrogen sulfide and sulfur dioxide, an air quality impact analysis for sulfur dioxide, the probable cause of excess gas buildup, and an assessment of any abatement alternatives.

If a request to flare excess gas is approved as necessary by the Department of Health, the approval may be subject to specified conditions. These conditions may

include, but are not limited to, provisions requiring the permittee to install, operate, and maintain sulfur dioxide ambient monitors and to submit to the Department of Health after the flaring event a report on the times flaring actually occurred, the sulfur dioxide emissions determined through either direct or indirect measurements, and any problems encountered during the flaring process.

10. All access roads into the property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during construction.

11. The permittee shall have proper safety devices on-site at least three days prior to commencement of [air] drilling **operations.** A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

12. Hydrogen sulfide abatement equipment with a minimum of 3,000 gallons of sodium hydroxide shall be on the property prior to the initiation of flow testing operations. Chemical storage tanks shall be maintained with sodium hydroxide at all times with no less than a three-day operating supply.

13. The permittee shall monitor the hydrogen sulfide concentration and emission rate continuously in the steam by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to five (5.0) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

    During periods of **well** equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and [shall so notify the Department of Health within one (1) hour of the occurrence. The permittee shall immediately] take **immediate** steps to correct the condition. **The Department of Health shall be immediately notified of the well equipment failure or malfunction.** If [repairs] **the well equipment in question** cannot be [accomplished] **repaired** within twenty-four (24) hours of the occurrence **or the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 23, 27 and 28,** the permittee shall cease operations and shut-in the well **in accordance with Special Condition Nos. 23, 27 and 28.** Within five (5) days of the occurrence, a report shall be submitted to the Department of Health [in accordance with Hawaii Administrative Rules, Section 11-60-14]. **The report shall include a description of the equipment failure or malfunction, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the repairs conducted to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule, or order which results from the well equipment failure or malfunction.**

14. Wet chemical tests for the determination of the hydrogen sulfide concentrations shall be conducted and recorded on a daily basis during all phases of the flow testing operations.

15. The following data shall be recorded during the flow testing operations:

    a. At least four times per 24-hour period, hydrogen sulfide ppm upstream from the injection system.

b. At least four times per 24-hour period, injection rate of sodium hydroxide.

c. At least four times per 24-hour period, hydrogen sulfide emission rate (lbs/hr) and concentration (ppm) downstream, after chemical injection.

d. Daily, zero and span check of hydrogen sulfide sensor.

e. Weekly, calibration check of hydrogen sulfide sensor.

f. Daily, the quantity of sodium hydroxide remaining in the abatement equipment storage tanks.

Additional entries will be made when significant changes in the resource occurs and when changes are made in injection rates of sodium hydroxide.

The aforementioned daily records a., b., and c. shall also be reported daily to the Department of Health by telephone no later than noon of the following work day. The Department of Health may at any time request additional data or revise the frequency of this daily telephone reporting requirement.

The records shall be kept at the well location at all times during the drilling and flow testing operations and shall be made available upon request by the Department of Health or its duly authorized representative. Copies or summaries of the records shall be provided within a reasonable time upon request by the Department of Health. The records shall be retained for at least three years following the date of such records.

16. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be operational prior to commencement of construction.

17. The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practical. Should any [inadvertent] releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases **result in hydrogen sulfide emissions of five (5.0) pounds per hour or more, or** exceed seven (7) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds seven (7) minutes in duration **in any one hour**, the permittee shall take immediate action to shut-in the well.

Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

18. Steam production rates and hydrogen sulfide concentrations shall be measured to determine hydrogen sulfide emissions in pounds per hour. A sodium hydroxide treatment mole ratio of 4 to 1 (NaOH/H2S) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations. A specific chemical treatment plan shall be submitted to the Department of Health prior to the commencement of flow testing. A copy of the plan shall

be maintained at the site at all times and supervisory personnel shall be aware of its provisions at all times.

19. The permittee shall promptly notify the Department of Health should any toxic emissions be encountered of public health concern and where dispersion into the ambient air was the mitigative action.

20. The permittee shall perform once on each well, testing and analyses for all of the following constituents of the steam condensate, steam, particulates and/or gases emanating from each well:

STEAM CONDENSATE/TOTAL STEAM	GAS PHASE
Benzene	Benzene
Ammonium (Total)	Hydrogen Sulfide
Arsenic	Ammonia
Lead	Radon 222 and daughters
Cadmium	Mercury Vapor
Bicarbonate and Carbonate	Methane
Sulfates	Non-Methane Hydro-carbons
Chlorides	Carbon dioxide
Nitrates	Sulfur dioxide
Boron (Total)	NESHAPS - pollutants as requested
Hydrogen Sulfide (Total)	
Fluorides (Total)	
Total Sulfur	
Mercury (Total)	
pH	
Total Dissolved Solids	
Total Suspended Solids	
Percent Noncondensibles	

21. The drilling rig diesel engine generators and pumps shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5 percent by weight. The permittee shall maintain records on the total amount of fuel oil consumed by all the diesel engines for the drilling of each well. The total gallons of fuel oil consumed shall be submitted to the Department of Health at the completion of each well.

22. Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second **(8.9 miles per hour)**. Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

    In no case shall any well venting coincide with any pipeline cleanouts or well flow testing operations, or commence if the power plant emergency steam release facility is being

utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

23. [Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all wellfield emissions. Within four (4) hours of the exceedance, the permittee shall reduce all wellfield hydrogen sulfide emissions associated with wellfield construction operations, including but not limited to drilling, flow testing, venting, etc., by a minimum of 50 percent of the level during the event. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall cease all drilling operations and shut-in all wells under construction, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).]

    In no case shall the well drilling, flow testing, venting operations, or well equipment failure or malfunction of any of the fourteen (14) geothermal exploratory/developmental wells cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall immediately notify the Department of Health, ceasing all well drilling with aerated mud or aerated water, well flow testing, and well venting operations, and shutting in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected wellfield construction activities shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the contributions from the well drilling with aerated mud or aerated water, well flow testing, well venting operations or well equipment repair will not result in or contribute to the exceedance of the hydrogen sulfide ambient concentration of 100 ppb (including background) on a one-hour average.

    The permittee shall submit to the Department of Health a written follow-up report within [two (2)] **five (5)** days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

24. [The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.]

25. The permittee may be required to install a control system acceptable to the Department of Health for the rapid throttling of steam flow and well shut-in on each developmental well prior to the well being connected to a resource distribution system. The requirement for a control system may be so specified in the subsequent Permit to Operate.

26. To prevent well blowouts, the permittee shall employ good drilling practices with proper blowout prevention equipment and experienced personnel in the drilling of the exploratory/developmental wells. Drilling supervisors shall be certified in blowout prevention at a minimum of once every two years by a recognized training center. In the unlikely event of a well blowout, the permittee shall immediately proceed with measures to kill or gain control of the well and notify the Department of Health.

    The permittee shall submit to the Department of Health a written report within five (5) days of the blowout. The report shall include, as a minimum, the probable cause of the blowout, the actions that have or will be taken, the estimated time before the well is controlled, an analysis of the air quality impact from the unabated emissions, and a monitoring plan to determine the actual air quality impact resulting from the blowout. A status report shall be submitted to the Department of Health on a weekly basis until such time the control of the well is established.

27. During those periods of normal power plant and **normal** wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant **(A-834)** and associated wellfield **(A-833)** shall not cause an increase in the **[**ambient**]** hydrogen sulfide **ambient** concentration in excess of 5 ppb **[**(one-hour average)**]** (above background) **on a one-hour average** at or beyond the project boundary **as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.** [During those periods when geothermal well drilling. well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.] **As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.**

28. [For any ambient hydrogen sulfide concentration in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or was otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.]

    Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

March 16, 1990

90-A100
File #834

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Modification to Authority to Construct No. A-834-796
25 MW Geothermal Power Plant
Located at TMK: 1-4-01:2 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii

Pursuant to Chapter 342B, Hawaii Revised Statutes, and Chapter 11-60, Hawaii Administrative Rules, the Department of Health (DOH) hereby modifies the subject Authority to Construct No. A-834-796.

The following modified special conditions supersede the corresponding special conditions of Attachment II issued with ATC No. A-834-796 dated February 6, 1990:

Special Condition No. 6

Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second (8.9 miles per hour). In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

Special Condition No. 7

The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement.

Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb (above background) and 100 ppb (including background) on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 25 ppb (above background) and 100 ppb (including background) on a one-hour average.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

Special Condition No. 13

The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. The permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The permittee shall take appropriate action in accordance with Special Condition Nos. 15, 17 and 18 if the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 15, 17 and 18. In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or

abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

Special Condition No. 15

The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall take immediate action terminating, within two (2) hours of the exceedance, all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate hydrogen sulfide ambient concentrations in excess of 100 ppb (including background) on a one-hour average, the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to the monitoring site. If the hydrogen sulfide ambient concentration is below 100 ppb (including background) on a one-hour average after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average.

The permittee shall submit a written report to the Department of Health within five (5) days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation (s) of this permit, law, rule or order.

Special Condition No. 17

During those periods of normal power plant and normal wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 5 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly

monitoring report. As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.

Special Condition No. 18

Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

The following special condition of Attachment II issued with ATC No. A-834-796 dated February 6, 1990 is hereby deleted:

Special Condition No. 16

The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

All other special conditions of Attachment II (Special Condition Nos. 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 14, 19 and 20) issued with ATC No. A-834-796 dated February 6, 1990 shall not be affected and shall remain valid.

These modifications shall become final twenty (20) days after receipt, unless before the twenty (20) days expire, Puna Geothermal Venture submits a written request to the Director of Health for a hearing pursuant to Chapters 91 and 342B, Hawaii Revised Statutes. If a hearing is requested, it will be held at a date, time, and place to be specified later and conducted in accordance with Chapter 91, Hawaii Revised Statutes, and the rules of Practice and Procedure of the Department of Health.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

WN/sk
cc: DHSA, Hawaii

COPY FOR YOUR INFORMATION

March 16, 1990
Ramseyer

ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-834-796
APPLICATION NO. A-834
POWER PLANT

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. The total fugitive isopentane emissions from all ten (10) Ormat Energy Converter (OEC) modules shall not exceed 0.4 lbs/hr or exceed 1000 ppm from any seal, flange, valve or any other fugitive emission point when measured from a distance of two (2) inches from the point. The permittee shall perform measurements on all fugitive isopentane emission points, as a minimum, on a weekly basis. The permittee shall take immediate corrective actions upon identifying any isopentane emissions in excess of 1000 ppm when measured from a distance of two (2) inches.

3. Records shall be maintained on all isopentane emission measurements, the amount of gallons of isopentane purchased, the amount of isopentane transferred to and from the OEC modules, and the amount of isopentane released to the atmosphere. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records. A report on the amount of isopentane released to the atmosphere shall be submitted to the Department of Health on an annual basis.

4. The geothermal fluids injection system shall include at least two (2) geothermal injection wells, a spare fluid pump, and a spare noncondensable gas compressor. The backup injection system equipment shall be maintained in good operating condition at all times and shall be utilized immediately upon identification of any malfunctioning equipment.

   In the event of an equipment malfunction or upset condition which results in a situation where the two geothermal injection wells are not capable of handling the total geothermal resource being utilized by the power plant, the power plant production and the associated geothermal resource being used shall be immediately reduced accordingly to the handling capacity of the two injection wells.

5. The diesel engine generator and the diesel firewater pump shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5% by weight.

6. Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second **(8.9 miles per hour)**. In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a

reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

7. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement.

   Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb **(above background)** and 100 ppb **(including background)** on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above **25 ppb (above background) and** 100 ppb **(including background) on a one-hour average.**

   Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

8. At the discretion of the Director of Health the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

9. All access roads into the permittee's property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during plant operations.

10. The emergency steam release facility, consisting of two (2) rock mufflers, chemical storage tank(s) and associated equipment, shall be installed, maintained, and be fully operational prior to commencement of plant operations. Each rock muffler shall be capable of handling a steam flow rate of 570,000 lbs/hr or 100 percent of the total power plant steam flow, whichever is greater.

11. The emergency steam release facility shall only be utilized under one or more of the following conditions:

    a) Failure of the electrical transmission lines out of the power plant or some incident that tripped all the steam turbines and OEC units;

    b) Complete upset of the geothermal fluid injection system;

c) Pressure in the steam lines exceeds safety design set points; or

d) Any upset situation which would otherwise result in a release of unabated steam to the atmosphere.

12. The emergency steam release facility shall be equipped and maintained at all times with a minimum three-day operating storage capacity of sodium hydroxide. The chemical abatement system shall operate automatically when steam is released through the rock muffler(s). The hydrogen sulfide concentrations shall be continuously monitored both downstream and upstream of the chemical injection point. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations.

Upon utilizing the emergency steam release facility, the permittee shall take immediate action to the extent practical to reduce the steam flow and perform the necessary corrective actions. The steam flow rate shall be reduced, as a minimum, to 50 percent of full flow within four (4) hours after initiating the use of the emergency steam release facility.

13. The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. **The permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The permittee shall take appropriate action in accordance with Special Condition Nos. 15, 17 and 18 if the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 15, 17 and 18.** In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

14. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be fully operational prior to commencement of construction.

15. [Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all power plant emissions. Within four (4) hours of the exceedance, the permittee shall terminate all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the ambient hydrogen sulfide concentration is below 100 ppb (one-hour average) after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the

resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).]

The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall take immediate action terminating, within two (2) hours of the exceedance, all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate hydrogen sulfide ambient concentrations in excess of 100 ppb (including background) on a one-hour average, the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to the monitoring site. If the hydrogen sulfide ambient concentration is below 100 ppb (including background) on a one-hour average after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average.

The permittee shall submit a written report to the Department of Health within [two (2)] **five (5)** days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order.

16. [The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.]

17. During those periods of normal power plant and **normal** wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant **(A-834)** and associated wellfield **(A-833)** shall not cause an increase in the [ambient] hydrogen sulfide **ambient** concentrations in excess of 5 ppb [(one-hour average)] (above background) **on a one-hour average** at or beyond the project boundary **as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.** [During those periods when geothermal well drilling, well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.] **As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in,**

being used as an injection well, or connected to a sound geothermal resource distribution system.

18. [For any ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or as otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.]

Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

19. During normal power plant operations, the hydrogen sulfide emissions from the 25 MW geothermal power plant shall not exceed one pound per hour (three-hour average). During periods of malfunction or regularly scheduled maintenance, best available control technology shall be applied for the hydrogen sulfide emissions.

20. The Department of Health may at any time with reasonable cause, request the permittee to install, operate, and maintain emission monitors to continuously measure and record the hydrogen sulfide and isopentane emissions at any specified location in the power plant.

REF:WL-KO

MAR 22 1990

Mr. Duane Kanuha, Director
Planning Department
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720

Dear Mr. Kanuha:

This is in reference to your letter of February 22, 1990 proposing the establishment of a technical task force to expedite the joint review of environmental monitoring programs associated with geothermal development activities.

I support your proposal and have authorized my staff to assist you in whatever way possible in your review of the monitoring programs submitted by Puna Geothermal Venture.

Please contact Manabu Tagomori, Deputy Director, at 548-7533 to coordinate the meetings of the task force.

Very truly yours,

WILLIAM W. PATY

MT:DN:GSM:ko

WL
SO
UP

Bernard K. Akana
Mayor
Duane Kanuha
Director
William L. Moore
Deputy Director

Planning Department

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

February 22, 1990

Mr. William Paty, Chairman
Board of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96804

Dr. John C. Lewin, Director
Department of Health
P. O. Box 3378
Honolulu, HI 96801

Dear Mr. Paty and Dr. Lewin:

Geothermal Resource Permit No. 2
Puna Geothermal Venture (PGV) - 25 MW (net) Development
Kapoho, Hawaii TMK: 1-4-01: por. 2, 3, por. 19, & 58

Geothermal Resource Permit No. 2 issued by our Planning Commission included several conditions which requires PGV to submit monitoring programs to the Planning Department for review and approval. These conditions also require the Planning Department to consult with the Department of Health and Department of Land and Natural Resources on these monitoring programs. We have recently received a Noise Monitoring Program, a Hydrologic Monitoring Program, and a Meteorological and Air Quality Monitoring Program from PGV.

I propose the establishment of a technical task force to expedite the joint review of such programs. Our staff (Planning, DOH, & DLNR) have already met at least once in response to PGV's request prior to this recent submittal. I propose that the staff involved at this earlier meeting continue in this effort.

For the immediate task, I would like to suggest the following:

Rodney Nakano, Hawaii County Planning
Dean Nakano, DOWALD
Wilfred Nagamine, DOH-Air
Chauncey Heu, DOH-Water
Tom Anamizu, DOH-Noise

It is my understanding that PGV has already distributed some of these programs to the above named staff. My staff will contact each of them to coordinate the review and to initiate a joint review session, if necessary. I am hopeful that both of you will find this proposal to be acceptable and will authorize your appropriate staff to this end.

Please call me as soon as possible if there are any questions.

Sincerely,

DUANE KANUHA
Planning Director

RKN:aeb

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD

March 16, 1990

Mr. Maurice A. Richard
Hawaii Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

SUBJECT: PUNA GEOTHERMAL VENTURE PROJECT
UNDERGROUND INJECTION CONTROL (UIC)
UIC APPLICATION NO. UH-1529

This is to inform you that the Department of Health has completed its review of your preliminary application and has determined that the conditions for the granting of approval to construct up to three (3) dedicated injection wells and up to nine (9) production/injection wells at the subject facility have been satisfied. Therefore, you are hereby granted approval to construct the proposed injection wells as indicated in your preliminary plans. You are requested to notify the Safe Drinking Water Branch within 24 hours of the commencement and completion of construction activities. Unless construction is commenced within 180 days from the date of this letter, this approval to construct shall be terminated other applicable state and federal statutes and rules must also be complied with before construction may begin. Copies of this approval and the preliminary application must be kept on the construction site for inspection by department personnel.

Please be advised that this approval to construct does not constitute a permit to operate the injection facility upon completion of construction. The issuance of a UIC permit to operate will be based on the satisfactory review and acceptance of the following items:

1. A registered professional engineer or qualified geologist report (hereinafter "report") which includes the data and results of the injection tests.

2. A Hydrologic (groundwater) Monitoring Program (HMP).

3. A production well and injection well Casing Monitoring Program (CMP).

The report as outlined in the application instructions under the heading "Construction of New Wells or Modification of Existing Wells" should be submitted following the construction and testing of the injection wells.

The department acknowledges the submittal of your hydrologic monitoring program (HMP) as prepared by Science Applications International Corporation. The HMP is currently being reviewed by the Safe Drinking Water Branch. Upon completion of the review, the department's comments will be submitted to you.

The department anticipates the submittal of your CMP as it will relate to the protection of the groundwater quality of the shallow aquifer. Your CMP will also be reviewed by the Division of Water and Land Development as it does relate to their regulations on geothermal activity.

If you have any questions regarding the processing of your application, please contact the Safe Drinking Water Branch at telephone 543-8258.

Sincerely,

JAMES K. IKEDA, Acting Chief
Environmental Management Division

CH:la

cc: 1) Rodney Nakano
Planning Commission
25 Aupuni Street
Hilo, Hawaii 96720

2) Dean Nakano
Division of Water and Land Development

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 6, 1990

90-A52
File #833

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Authority to Construct (ATC) No. A-833-795
Application for ATC No. A-833
Expiration Date: February 1, 1992

An Authority to Construct in accordance with Administrative Rules, Title 11, Chapter 60, is hereby issued to Puna Geothermal Venture for Fourteen (14) Geothermal Exploratory/ Developmental Wells located at TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. The issuance of this permit is based on the plans, specifications, and additional information that you submitted as part of your application dated March 24, 1989 and the subsequent information submitted on June 9, 1989.

Although the Authority to Construct application is for the construction of 30 geothermal wells over the life of the project, the subject Authority to Construct permit authorizes the construction of only 14 geothermal wells which have been deemed necessary to initially supply and support the power plant operating at maximum capacity. Authority to Construct application(s) for additional geothermal wells should be submitted as the needs are identified.

The Authority to Construct is issued subject to the conditions set forth in Attachments I and II.

Also enclosed is Form AS-P-3, Application for Permit to Operate a Facility. Please submit this application with the applicable filing fee sixty (60) days prior to each well being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. In addition, you must submit to the Department in writing the notification of completion of construction. The Authority to Construct must remain in effect until the Permit to Operate is granted or denied for the fourteen (14) geothermal exploratory/ developmental wells.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

Enclosures
cc: DHSA: Hawaii

ATTACHMENT I. STANDARD CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-833-795
APPLICATION NO. A-833
WELLFIELD

This permit is granted in accordance with the State of Hawaii Administrative Rules, Title 11, Chapter 60, Air Pollution Control, and is subject to the following standard conditions:

1. This permit is non-transferable from person to person, from place to place, or from one piece of equipment to another.

2. This permit is automatically void if construction has not begun within one year of the date of issuance or if the work involved is suspended for one year or more.

3. This permit is automatically void when the Permit to Operate is issued or denied for all fourteen (14) exploratory/developmental wells.

4. The facility covered by this permit shall be constructed as specified in the application for Authority to Construct. There shall be no deviation unless additional or revised plans are submitted to and approved by the Department.

5. This permit is not a guarantee that the facility will receive a Permit to Operate at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules, Regulations, and Orders of the Department.

6. This authority, (a) shall not in any manner affect the title of the premises upon which the equipment is to be located, (b) does not release the permittee from any liability for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment, (c) does not release the permittee from compliance with other applicable statutes of the State of Hawaii, or with applicable local laws, regulations, or ordinances, and (d) in no manner implies or suggests that the Department, or its officers, agents, or employees, assumes any liability, directly or indirectly, for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment.

7. The Department is to be notified promptly in writing upon completion of the construction or installation of any equipment for which an Authority to Construct has been issued.

ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-833-795
APPLICATION NO. A-833
WELLFIELD

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and approval obtained with minimal delay from the Department of Health prior to commencement of construction of each well. Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

3. The Department of Health shall act on a Permit to Operate Application prior to any well approved under this permit being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

4. No geothermal exploratory/developmental wells shall be located within 600 feet of the property boundary. If any federal, state or county permit or order stipulates a distance greater than 600 feet in which no geothermal wells can be located, the greater distance shall so apply.

5. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

   Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb and 100 ppb on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 100 ppb.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

6. At the discretion of the Director of Health, the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

7. The permittee shall notify the Department of Health in writing at least two (2) working days prior to the commencement, and within two (2) working days after the completion of the aerated mud or aerated water drilling, well venting, and flow testing operations, for each geothermal well.

8. Upon completion of flow testing operations, each geothermal well shall be shut-in or otherwise prevented from discharging to the atmosphere in accordance with appropriate standards of operation and maintenance and at no time be placed on continuous or standby bleed status.

9. Occasional flaring of excess hydrogen sulfide gas from the completed wells is prohibited unless such flaring is necessary to insure well integrity or safety and is conducted in such a manner that no state or national ambient air quality standards for sulfur dioxide are exceeded. Records shall be maintained on all flaring episodes, and shall include, as a minimum, the date, time and duration of the event, probable causes of the excess gas buildup, and the estimated emissions of sulfur dioxides determined through either direct or indirect measurements. The records shall be in a permanent form suitable for inspection and shall be retained for at least three (3) years following the date of such records. The permittee shall submit a written report monthly to the Department of Health on the flaring episodes which demonstrates compliance with the requirements of this condition. If flaring occurs frequently or routinely, the permittee shall install, operate, and maintain ambient sulfur dioxide monitors at each air quality monitoring station and comply with all recordkeeping requirements in accordance with Special Condition No. 5.

10. All access roads into the property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during construction.

11. The permittee shall have proper safety devices on-site at least three days prior to commencement of air drilling. A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

12. Hydrogen sulfide abatement equipment with a minimum of 3,000 gallons of sodium hydroxide shall be on the property prior to the initiation of flow testing operations.

Chemical storage tanks shall be maintained with sodium hydroxide at all times with no less than a three-day operating supply.

13. The permittee shall monitor the hydrogen sulfide concentration and emission rate continuously in the steam by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to five (5.0) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

    During periods of equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and shall so notify the Department of Health within one (1) hour of the occurrence. The permittee shall immediately take steps to correct the condition. If repairs cannot be accomplished within twenty-four (24) hours of the occurrence, the permittee shall cease operations and shut-in the well. Within five (5) days of the occurrence, a report shall be submitted to the Department of Health in accordance with Hawaii Administrative Rules, Section 11-60-14.

14. Wet chemical tests for the determination of the hydrogen sulfide concentrations shall be conducted and recorded on a daily basis during all phases of the flow testing operations.

15. The following data shall be recorded during the flow testing operations:

    a. At least four times per 24-hour period, hydrogen sulfide ppm upstream from the injection system.

    b. At least four times per 24-hour period, injection rate of sodium hydroxide.

    c. At least four times per 24-hour period, hydrogen sulfide emission rate (lbs/hr) and concentration (ppm) downstream, after chemical injection.

    d. Daily, zero and span check of hydrogen sulfide sensor.

    e. Weekly, calibration check of hydrogen sulfide sensor.

    f. Daily, the quantity of sodium hydroxide remaining in the abatement equipment storage tanks.

    Additional entries will be made when significant changes in the resource occurs and when changes are made in injection rates of sodium hydroxide.

    The aforementioned daily records a., b., and c. shall also be reported daily to the Department of Health by telephone no later than noon of the following work day. The Department of Health may at any time request additional data or revise the frequency of this daily telephone reporting requirement.

    The records shall be kept at the well location at all times during the drilling and flow testing operations and shall be made available upon request by the Department of Health

or its duly authorized representative. Copies or summaries of the records shall be provided within a reasonable time upon request by the Department of Health. The records shall be retained for at least three years following the date of such records.

16. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be operational prior to commencement of construction.

17. The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practical. Should any inadvertent releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases exceed seven (7) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds seven (7) minutes in duration, the permittee shall take immediate action to shut-in the well.

    Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

18. Steam production rates and hydrogen sulfide concentrations shall be measured to determine hydrogen sulfide emissions in pounds per hour. A sodium hydroxide treatment mole ratio of 4 to 1 (NaOH/H2S) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations. A specific chemical treatment plan shall be submitted to the Department of Health prior to the commencement of flow testing. A copy of the plan shall be maintained at the site at all times and supervisory personnel shall be aware of its provisions at all times.

19. The permittee shall promptly notify the Department of Health should any toxic emissions be encountered of public health concern and where dispersion into the ambient air was the mitigative action.

20. The permittee shall perform once on each well, testing and analyses for all of the following constituents of the steam condensate, steam, particulates and/or gases emanating from each well:

STEAM CONDENSATE/TOTAL STEAM	GAS PHASE
Benzene	Benzene
Ammonium (Total)	Hydrogen Sulfide
Arsenic	Ammonia
Lead	Radon 222 and daughters
Cadmium	Mercury Vapor
Bicarbonate and Carbonate	Methane
Sulfates	

STEAM CONDENSATE/TOTAL STEAM	GAS PHASE
Chlorides	Non-Methane Hydro-carbons
Nitrates	Carbon dioxide
Boron (Total)	Sulfur dioxide
Hydrogen Sulfide (Total)	NESHAPS - pollutants as requested
Fluorides (Total)	
Total Sulfur	
Mercury (Total)	
pH	
Total Dissolved Solids	
Total Suspended Solids	
Percent Noncondensibles	

21. The drilling rig diesel engine generators and pumps shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5 percent by weight. The permittee shall maintain records on the total amount of fuel oil consumed by all the diesel engines for the drilling of each well. The total gallons of fuel oil consumed shall be submitted to the Department of Health at the completion of each well.

22. Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second. Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

    In no case shall any well venting coincide with any pipeline cleanouts or well flow testing operations, or commence if the power plant emergency steam release facility is being utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

23. Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all wellfield emissions. Within four (4) hours of the exceedance, the permittee shall reduce all wellfield hydrogen sulfide emissions associated with wellfield construction operations, including but not limited to drilling, flow testing, venting, etc., by a minimum of 50 percent of the level during the event. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall cease all drilling operations and shut-in all wells under construction, unless the permittee can conclusively show to the Department of Health that the project operations and emissions

are not contributing any impact to monitoring site. If the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).

The permittee shall submit to the Department of Health a written follow-up report within two (2) days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

24. The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

25. The permittee may be required to install a control system acceptable to the Department of Health for the rapid throttling of steam flow and well shut-in on each developmental well prior to the well being connected to a resource distribution system. The requirement for a control system may be so specified in the subsequent Permit to Operate.

26. To prevent well blowouts, the permittee shall employ good drilling practices with proper blowout prevention equipment and experienced personnel in the drilling of the exploratory/developmental wells. Drilling supervisors shall be certified in blowout prevention at a minimum of once every two years by a recognized training center. In the unlikely event of a well blowout, the permittee shall immediately proceed with measures to kill or gain control of the well and notify the Department of Health.

    The permittee shall submit to the Department of Health a written report within five (5) days of the blowout. The report shall include, as a minimum, the probable cause of the blowout, the actions that have or will be taken, the estimated time before the well is controlled, an analysis of the air quality impact from the unabated emissions, and a monitoring plan to determine the actual air quality impact resulting from the blowout. A status report shall be submitted to the Department of Health on a weekly basis until such time the control of the well is established.

27. During those periods of normal power plant and wellfield operation, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant and associated wellfield shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 5 ppb (one-hour average) above background at or beyond the project boundary. During those periods when geothermal well drilling. well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.

28. For any ambient hydrogen sulfide concentration in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or was otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 6, 1990

90-A51
File #834

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Authority to Construct (ATC) No. A-834-796
Application for ATC No. A-834
Expiration Date: February 1, 1992

An Authority to Construct in accordance with Administrative Rules, Title 11, Chapter 60, is hereby issued to Puna Geothermal Venture for a 25 MW Geothermal Power Plant located at TMK: 1-4-01:2 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. The issuance of this permit is based on the plans, specifications, and additional information that you submitted as part of your application dated March 24, 1989 and the subsequent information submitted on June 9, 1987.

The Authority to Construct is issued subject to the conditions set forth in Attachments I and II.

Also enclosed is Form AS-P-3, Application for Permit to Operate a Facility. Please submit this application with the applicable filing fee sixty (60) days before the end of construction. In addition, you must submit to the Department in writing the notification of completion of construction. The Authority to Construct must remain in effect until the Permit to Operate is granted or denied.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

Enclosures
cc: DHSA, Hawaii

ATTACHMENT I. STANDARD CONDITIONS OF AUTHORITY TO CONSTRUCT,
NO. A-834-796
APPLICATION NO. A-834
POWER PLANT

This permit is granted in accordance with the State of Hawaii Administrative Rules, Title 11, Chapter 60, Air Pollution Control, and is subject to the following standard conditions:

1. This permit is non-transferable from person to person, from place to place, or from one piece of equipment to another.

2. This permit is automatically void if construction has not begun within one year of the date of issuance or if the work involved is suspended for one year or more.

3. This permit is automatically void when a Permit to Operate is issued or denied.

4. The facility covered by this permit shall be constructed as specified in the application for Authority to Construct. There shall be no deviation unless additional or revised plans are submitted to and approved by the Department.

5. This permit is not a guarantee that the facility will receive a Permit to Operate at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules, Regulations, and Orders of the Department.

6. This authority, (a) shall not in any manner affect the title of the premises upon which the equipment is to be located, (b) does not release the permittee from any liability for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment, (c) does not release the permittee from compliance with other applicable statutes of the State of Hawaii, or with applicable local laws, regulations, or ordinances, and (d) in no manner implies or suggests that the Department, or its officers, agents, or employees, assumes any liability, directly or indirectly, for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment.

7. The Department is to be notified promptly in writing upon completion of the construction or installation of any equipment for which an Authority to Construct has been issued.

8. The operation of this equipment is sanctioned by this Authority to Construct provided that the permittee has completed the following:

   (a) Submittal of written notification of completion of construction or installation to the Department;

   (b) Submittal of Permit to Operate Application, Form AS-P-3, to the Department; and

   (c) Adherence to all applicable "special conditions" as included in the Authority to Construct.

ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-834-796
APPLICATION NO. A-834
POWER PLANT

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. The total fugitive isopentane emissions from all ten (10) Ormat Energy Converter (OEC) modules shall not exceed 0.4 lbs/hr or exceed 1000 ppm from any seal, flange, valve or any other fugitive emission point when measured from a distance of two (2) inches from the point. The permittee shall perform measurements on all fugitive isopentane emission points, as a minimum, on a weekly basis. The permittee shall take immediate corrective actions upon identifying any isopentane emissions in excess of 1000 ppm when measured from a distance of two (2) inches.

3. Records shall be maintained on all isopentane emission measurements, the amount of gallons of isopentane purchased, the amount of isopentane transferred to and from the OEC modules, and the amount of isopentane released to the atmosphere. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records. A report on the amount of isopentane released to the atmosphere shall be submitted to the Department of Health on an annual basis.

4. The geothermal fluids injection system shall include at least two (2) geothermal injection wells, a spare fluid pump, and a spare noncondensable gas compressor. The backup injection system equipment shall be maintained in good operating condition at all times and shall be utilized immediately upon identification of any malfunctioning equipment.

   In the event of an equipment malfunction or upset condition which results in a situation where the two geothermal injection wells are not capable of handling the total geothermal resource being utilized by the power plant, the power plant production and the associated geothermal resource being used shall be immediately reduced accordingly to the handling capacity of the two injection wells.

5. The diesel engine generator and the diesel firewater pump shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5% by weight.

6. Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second. In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property

boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

7. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement. Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb and 100 ppb on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 100 ppb.

   Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

8. At the discretion of the Director of Health the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

9. All access roads into the permittee's property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during plant operations.

10. The emergency steam release facility, consisting of two (2) rock mufflers, chemical storage tank(s) and associated equipment, shall be installed, maintained, and be fully operational prior to commencement of plant operations. Each rock muffler shall be capable of handling a steam flow rate of 570,000 lbs/hr or 100 percent of the total power plant steam flow, whichever is greater.

11. The emergency steam release facility shall only be utilized under one or more of the following conditions:

    a) Failure of the electrical transmission lines out of the power plant or some incident that tripped all the steam turbines and OEC units;

b) Complete upset of the geothermal fluid injection system;

c) Pressure in the steam lines exceeds safety design set points; or

d) Any upset situation which would otherwise result in a release of unabated steam to the atmosphere.

12. The emergency steam release facility shall be equipped and maintained at all times with a minimum three-day operating storage capacity of sodium hydroxide. The chemical abatement system shall operate automatically when steam is released through the rock muffler(s). The hydrogen sulfide concentrations shall be continuously monitored both downstream and upstream of the chemical injection point. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations.

Upon utilizing the emergency steam release facility, the permittee shall take immediate action to the extent practical to reduce the steam flow and perform the necessary corrective actions. The steam flow rate shall be reduced, as a minimum, to 50 percent of full flow within four (4) hours after initiating the use of the emergency steam release facility.

13. The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

14. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be fully operational prior to commencement of construction.

15. Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all power plant emissions. Within four (4) hours of the exceedance, the permittee shall terminate all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the ambient hydrogen sulfide concentration is below 100 ppb (one-hour average) after the project emissions have been reduced, the permittee shall maintain the emissions at

this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).

The permittee shall submit a written report to the Department of Health within two (2) days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order.

16. The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

17. During those periods of normal power plant and wellfield operation, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant and associated wellfield shall not cause an increase in the ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background at or beyond the project boundary. During those periods when geothermal well drilling, well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.

18. For any ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or as otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.

19. During normal power plant operations, the hydrogen sulfide emissions from the 25 MW geothermal power plant shall not exceed one pound per hour (three-hour average). During periods of malfunction or regularly scheduled maintenance, best available control technology shall be applied for the hydrogen sulfide emissions.

20. The Department of Health may at any time with reasonable cause, request the permittee to install, operate, and maintain emission monitors to continuously measure

and record the hydrogen sulfide and isopentane emissions at any specified location in the power plant.

b) Complete upset of the geothermal fluid injection system;

c) Pressure in the steam lines exceeds safety design set points; or

d) Any upset situation which would otherwise result in a release of unabated steam to the atmosphere.

12. The emergency steam release facility shall be equipped and maintained at all times with a minimum three-day operating storage capacity of sodium hydroxide. The chemical abatement system shall operate automatically when steam is released through the rock muffler(s). The hydrogen sulfide concentrations shall be continuously monitored both downstream and upstream of the chemical injection point. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations.

Upon utilizing the emergency steam release facility, the permittee shall take immediate action to the extent practical to reduce the steam flow and perform the necessary corrective actions. The steam flow rate shall be reduced, as a minimum, to 50 percent of full flow within four (4) hours after initiating the use of the emergency steam release facility.

13. The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

14. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be fully operational prior to commencement of construction.

15. Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all power plant emissions. Within four (4) hours of the exceedance, the permittee shall terminate all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the ambient hydrogen sulfide concentration is below 100 ppb (one-hour average) after the project emissions have been reduced, the permittee shall maintain the emissions at

this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).

The permittee shall submit a written report to the Department of Health within two (2) days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order.

16. The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

17. During those periods of normal power plant and wellfield operation, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant and associated wellfield shall not cause an increase in the ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background at or beyond the project boundary. During those periods when geothermal well drilling, well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.

18. For any ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or as otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.

19. During normal power plant operations, the hydrogen sulfide emissions from the 25 MW geothermal power plant shall not exceed one pound per hour (three-hour average). During periods of malfunction or regularly scheduled maintenance, best available control technology shall be applied for the hydrogen sulfide emissions.

20. The Department of Health may at any time with reasonable cause, request the permittee to install, operate, and maintain emission monitors to continuously measure

and record the hydrogen sulfide and isopentane emissions at any specified location in the power plant.

IN THE DEPARTMENT OF HEALTH

STATE OF HEALTH

PUNA GEOTHERMAL VENTURE 25 MW GEOTHERMAL POWER PLANT AND WELLFIELD STATE AUTHORITY TO CONSTRUCT PERMITS REGULATING THE EMISSIONS OF AIR POLLUTANTS	)	DOCKET NO. 89-EP-PA-13 HEARING OFFICER'S REPORT

HEARING OFFICER'S REPORT

Public hearings were conducted on November 7 and 8, 1989 at the Kailua-Kona Library, 75-138 Hualalai Road, Kailua-Kona, and UH-Hilo, Campus Center Activities Building, Rooms 306-307, 523 W. Lanikaula Street, Hilo, Hawaii, respectively. The purpose of the hearings was to consider and accept testimonies on Two Draft Permits, Regulating the Emissions of Air Pollutants, for the Puna Geothermal Venture's proposed construction of a 25 MW Geothermal Power Plant and Wellfield. The notice announcing the public hearings appeared in the Honolulu Advertiser, West Hawaii Today, and Hawaii Tribune Herald on October 6, 1989. Public comments and testimonies were accepted from the time of the notice until November 15, 1989.

FINDINGS OF FACT

1. Puna Geothermal Venture proposes to construct a 25 MW (net) geothermal power plant at Kilauea Lower East Rift Zone, Puna, Hawaii.
2. Puna Geothermal Venture proposes to construct fourteen (14) geothermal wells to supply and support the initial power plant operations.
3. The power plant consisting essentially of 10 integrated modular generating units, injection wells, air-cooled condensers, moisture separators, and vaporizers, is designed to re-inject all geothermal fluids produced back into the reservoir.
4. The power plant will incorporate an emergency steam release facility consisting of two (2) rock mufflers and caustic injection for utilization during upset conditions.

5. Puna Geothermal Venture shall install, maintain, and ope..e as a minimum, three (3) air quality monitoring stations and one meteorological monitoring station.

6. During normal operations, the power plant shall not cause an increase in the ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background.

PARTICIPATING CITIZENS

The Department of Health received written testimonies from the following individuals:

Name	Representing
Roger Ulveling	Director of Business & Economic Development
Robert Petricci	Leilani Community Association
Russell Kokubun	County of Hawaii
Karl Kirkendall	Self
Melissa Kirkendall	Self
R.W. Salzer	Self
Michael La Plante	Self
Greg Plescia	Self
Ron Phillips	Puna Community Council
Steve Slater	Self
Jane Hedtke	Kapoho Community Association
Jennifer Perry	Kapoho Grown
Steve Phillips	Self
Anne Wheelock	Self
Margaret McGuire	Self
Lawrence Jones	Self
Nelson Ho	Sierra Club
James Morrow	American Lung Association of Hawaii
Bonnie Gold	Self
Jette Slater	Self
Steven Moser	Self

WRITTEN TESTIMONIES

During the public comment period and at the hearing, the Department of Health received numerous comments on the proposed project and two Draft Permits. A brief description of the written comments received and the Department of Health's responses are attached.

REQUEST FOR CONTESTED CASE HEARING

In addition to the written comments, numerous petitions were filed with the Department of Health requesting a contested case hearing. The petitions and requests were referred to the Department of the Attorney General for review, where it was determined that there was no legal mandate to grant such a request under Section 342B-4, Hawaii Revised Statutes.

CONCLUSION/RECOMMENDATIONS

This hearing officer feels that the concerns and issues received during the public hearing and the public comment period were addressed by the Clean Air Branch staff. Additionally, the conditions imposed in the ATC permits enables the Department to monitor construction activities to ensure the protection of public health. Therefore, this hearing officer recommends adoption of the ATC permits.

DATED: Honolulu, Hawaii 2-6-90

James K. Ikeda

JAMES K. IKEDA
Hearing Officer

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

January 9, 1990

MEMORANDUM

TO: Dr. Bruce Anderson, Deputy Director
Department of Health

FROM: Manabu Tagomori, Deputy Director
Commission on Water Resource Management

SUBJECT: Review of Puna Geothermal Venture's Underground Injection Control (UIC) Permit Application No. UH-1529

Thank you for the opportunity to review and comment on the UIC Permit application submitted by Puna Geothermal Venture (PGV).

The Department of Land and Natural Resources (DLNR) has no major objections to PGV's proposal to re-inject geothermal fluids into the geothermal reservoir, but would like to offer the following comments:

1) Based on PGV's proposal to re-inject geothermal fluids and non-condensable gases into the geothermal reservoir, and in response to community concerns regarding potential impacts to the ground water aquifer downgradient from the project site, we recommend that if a water supply well is to be developed, it be strategically placed within the project area to maximize its use as a monitor well. Proper placement of the proposed well relative to existing wells in the area will allow for better ground-water monitoring.

   The applicant should be informed that under Chapter 13-168, HAR, a well construction permit, a pump installation permit, and a well completion report will be required for the construction of the water well.

2) No DLNR permit is required for those wells specifically dedicated and drilled for injection purposes; however, the conversion of any existing geothermal production well into an injection well (i.e. Alternative 1 - wells not specifically drilled for injection purposes) will require a well modification permit from DLNR.

3) Pursuant to HAR, Chapter 13-183, all geothermal wells must be cased in a manner to provide adequate anchorage for blowout-prevention equipment that will protect ground-water resources and the general environment. Also, permanent wellhead completion equipment and all casing strings must provide for adequate well pressure control and operational safety. Our review of the two injection well designs (Alternative 1 and Alternative 2) identified in PGV's UIC application indicates that the proposed casings meet the requirements set forth in Section 13-183-71.

During the setting of the casing, sufficient cement should be used to exclude overlying formation fluids from the injection zone and to prevent movement of fluids behind the casing into zones that contain ground water. Furthermore, all cement should contain a high temperature resistant admixture.

4) We also recommend that casing strings be pressure-tested after cementing and before commencing other operations on the well. Test pressures should be applied and monitored for a period of 30 minutes. A drop of more than ten percent of the pressure may be indicative of a defective casing or cement job.

5) Surveys should be required for all injection wells to determine deviations from the vertical and to establish the location of the intended zone of injection. Well deviation surveys should be filed with DLNR.

6) In addition, within six months after completion/modification of any well, the operator must file with DLNR the following well reports: a) drilling log and core report; b) well history report; c) well summary report; and (d) other supplemental information related to the injection operations.

7) The operator of any injection well must also file monthly reports of re-injection data, including quantity and chemical composition of fluids injected and any changes in injection pressures which may indicate that the injected fluids are no longer confined to the intended zone of injection.

8) As part of the monitoring plan, PGV should acquire adequate environmental baseline data prior to commencement of injection operations. Monitoring for potential impacts associated with such activity should include periodic water sampling and regular inspections of the injection facility.

9) Lastly, all work pertaining to the lands and permittee's operations should be performed in accordance with our Department's Administrative Rules (Chapters 13-183 and 13-168) and all other applicable Federal, State, and County laws,

ordinances, and regulations, including all water and air pollution control laws relating to the environment.

Thank you for this opportunity to comment on the subject application. Should you have any questions, please contact George Matsumoto at Ext. 7619.

for MANABU TAGOMORI
Deputy Director

DN:fc

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD

November 30, 1989

Mr. Manabu Tagomori
Deputy Director
Commission on Water Resource Management
Department of Land & Natural Resources
P.O. Box 373
Honolulu, Hawaii 96809

Dear Mr. Tagomori:

SUBJECT: PUNA GEOTHERMAL VENTURE PROJECT
UNDERGROUND INJECTION CONTROL (UIC)
UIC APPLICATION NO. UH-1529

Enclosed is an application for an Underground Injection Control permit to operate injection wells for the proposed geothermal project. We would appreciate any comments you may have concerning this project's injection wells in regards to their impact on underground sources of drinking water and hydrogeologic conditions of the area. We are also interested in any geothermal permit conditions that may be generated from your office that could apply to the UIC permit.

For your information, the two primary areas of concern to us are: 1) a long-term geothermal well casing monitoring plan, and 2) a long-term groundwater monitoring plan. Your comments will be used to determine the issuance of a UIC permit for this project and other requirements that should be imposed on the permittee for proper subsurface injection, if a permit is granted.

If you have any questions concerning this subject, please contact Chauncey Hew at the Safe Drinking Water Branch at telephone 543-8258.

Thank you for your assistance.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

CH:la
Enclosure: UIC Application No. UH-1529

ORMAT®

June 26, 1989
Reference No. 89238

Mr. Chauncey Hew
Drinking Water Program
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Application for Underground Injection Control (UIC) Permit from the Puna Geothermal Venture (PGV) Project

Dear Mr. Hew:

Pursuant to Administrative Rules, Title 11, Chapter 23 of the Department of Health, attached are three (3) copies of the Application for a UIC Permit for the PGV Project. Also attached is a check in the amount of $100.00 for the filing fee.

PGV plans to construct and operate the 25 MW PGV Project in the Puna District of the Island of Hawaii. The project will drill geothermal wells within a dedicated 500-acre area, use the produced geothermal fluid to generate electricity for sale to the Hawaii Electric Light Company for use on the Island of Hawaii, and inject all the project geothermal fluids back into the geothermal reservoir. Since the project will use injection wells, it will require a UIC permit from the Drinking Water Section of the State of Hawaii Department of Health.

This UIC permit application is being filed for a well system classified as Class V, Subclass B injection wells, which applies to "injection wells which inject non-polluting fluids into any geohydrologic formation, including non-exempt aquifers." PGV will be injecting the produced geothermal fluid into the zone below 4,000 feet, back into the same geothermal reservior from which it was withdrawn. Other than the loss of heat, which will be used to generate electricity, the geothermal fluids will to contain the same constituents as the geothermal reservoir. PGV has proposed a casing program using premium grade materials and cements to prevent leakage of injected fluids from the casing to the upper groundwater aquifer, a groundwater aquifer which is already influenced by the natural leakage of geothermal fluids from the zone below 4,000 feet.

PUNA GEOTHERMAL VENTURE

☐ 101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720 • Telephone (808) 961-2184 • Facsimile (808) 961-3531
☐ 610 East Glendale Ave., Sparks, Nevada 89431-5811 • Telephone (702) 356-9111 • Facsimile (702) 356-9125

The UIC permit is a two-step application process, and this application is for the initial construction stage. As such, it contains the information required under Sections 11-23-60(a)(1) through 11-23-60(a)(15) of the existing UIC regulations.

We appreciate your cooperation in preparing this application and offer our full assistance in your timely review and approval of this UIC permit.

Sincerely,

Maurice A. Richard
Puna Geothermal Venture
Hawaii Regional
Development Manager

Attachments

cc:
D. Carey, EMA w/attachments

MAR/ci

DRAFT: PGV-Wellfield
09/25/89

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

A0962NH
File #833

Mr. Maurice A. Richard
Regional Development Manager
Puna-Geothermal-Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Authority to Construct (ATC) No. A-833-XXX
Application for ATC No. A-833
Expiration Date: (will be valid for 2 years)

An Authority to Construct in accordance with Administrative Rules, Title 11, Chapter 60, is hereby issued to Puna Geothermal Venture for Fourteen (14) Geothermal Exploratory/Developmental Wells located at TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. The issuance of this permit is based on the plans, specifications, and additional information that you submitted as part of your application dated March 24, 1989 and the subsequent information submitted on June 9, 1989.

Although the Authority to Construct application is for the construction of 30 geothermal wells over the life of the project, the subject Authority to Construct permit authorizes the construction of only 14 geothermal wells which have been deemed necessary to initially supply and support the power plant operating at maximum capacity. Authority to Construct application(s) for additional geothermal wells should be submitted as the needs are identified.

The Authority to Construct is issued subject to the conditions set forth in Attachments I and II.

Also enclosed is Form AS-P-3, Application for Permit to Operate a Facility. Please submit this application with the applicable filing fee sixty (60) days prior to each well being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. In addition, you must submit to the Department in writing the notification of completion of construction. The Authority to Construct must remain in effect

until the Permit to Operate is granted or denied for the fourteen (14) geothermal exploratory/developmental wells.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

Enclosures
cc: PIE
DHSA, Hawaii

ATTACHMENT I. STANDARD CONDITIONS

This permit is granted in accordance with the State of Hawaii Administrative Rules, Title 11, Chapter 60, Air Pollution Control, and is subject to the following standard conditions:

1. This permit is non-transferable from person to person, from place to place, or from one piece of equipment to another.

2. This permit is automatically void if construction has not begun within one year of the date of issuance or if the work involved is suspended for one year or more.

3. This permit is automatically void when the Permit to Operate is issued or denied for all fourteen (14) exploratory/developmental wells.

4. The facility covered by this permit shall be constructed as specified in the application for Authority to Construct. There shall be no deviation unless additional or revised plans are submitted to and approved by the Department.

5. This permit is not a guarantee that the facility will receive a Permit to Operate at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules, Regulations, and Orders of the Department.

6. This authority, (a) shall not in any manner affect the title of the premises upon which the equipment is to be located, (b) does not release the permittee from any liability for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment, (c) does not release the permittee from compliance with other applicable statutes of the State of Hawaii, or with applicable local laws, regulations, or ordinances, and (d) in no manner implies or suggests that the Department, or its officers, agents, or employees, assumes any liability, directly or indirectly, for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment.

7. The Department is to be notified promptly in writing upon completion of the construction or installation of any equipment for which an Authority to Construct has been issued.

ATTACHMENT II. SPECIAL CONDITIONS

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and accepted by the Department of Health prior to commencement of construction of each well. Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

3. The Department of Health shall act on a Permit to Operate Application prior to any well approved under this permit being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

4. No geothermal exploratory/developmental wells shall be located within 600 feet of the property boundary. If any federal, state or county permit or order stipulates a distance greater than 600 feet in which no geothermal wells can be located, the greater distance shall so apply.

5. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

   Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 139 micrograms per cubic meter of air on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of the exceedance.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

6. At the discretion of the Director of Health, the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

7. The permittee shall notify the Department of Health in writing at least two (2) working days prior to the commencement, and within two (2) working days after the completion of the aerated mud or aerated water drilling, well venting, and flow testing operations, for each geothermal well.

8. Upon completion of flow testing operations, each geothermal well shall be shut-in or otherwise prevented from discharging to the atmosphere in accordance with appropriate standards of operation and maintenance and at no time be placed on continuous or standby bleed status.

9. Occasional flaring of excess hydrogen sulfide gas from the completed wells is prohibited unless necessary to insure well integrity or safety. Records shall be maintained on all flaring episodes, and shall include, as a minimum, the date, time and duration of the event, probable causes of the excess gas buildup, and the estimated emissions of hydrogen sulfide and sulfur dioxides. The records shall be in a permanent form suitable for inspection and shall be retained for at least three (3) years following the date of such records. The permittee shall submit a written report monthly to the Department of Health on the flaring episodes. If flaring occurs frequently or routinely, the permittee shall install, operate, and maintain ambient sulfur dioxide monitors at each air quality monitoring station and comply with all recordkeeping requirements in accordance with Special Condition No. 5.

10. All access roads into the property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during construction.

11. The permittee shall have proper safety devices on-site at least three days

prior to commencement of air drilling. A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

12. Hydrogen sulfide abatement equipment with a minimum of 3,000 gallons of sodium hydroxide shall be on the property prior to the initiation of flow testing operations. Chemical storage tanks shall be maintained with sodium hydroxide at all times with no less than a three-day operating supply.

13. The permittee shall monitor the hydrogen sulfide concentrations and emissions continuously by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to eight and one-half (8.5) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

    During periods of equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and shall so notify the Department of Health within one (1) hour of the occurrence. The permittee shall immediately take steps to correct the condition. If repairs cannot be accomplished within twenty-four (24) hours of the occurrence, the permittee shall cease operations and shut-in the well. Within five (5) days of the occurrence, a report shall be submitted to the Department of Health in accordance with Hawaii Administrative Rules, Section 11-60-14.

14. Wet chemical tests for the determination of the hydrogen sulfide concentrations shall be conducted and recorded on a daily basis during all phases of the flow testing operations.

15. The following data shall be recorded during the flow testing operations:

    a. At least four times per 24-hour period, hydrogen sulfide ppm upstream from the injection system.

    b. At least four times per 24-hour period, injection rate of sodium hydroxide.

    c. At least four times per 24-hour period, hydrogen sulfide emission rate (lbs/hr) and concentration (ppm) downstream, after chemical injection.

    d. Daily, zero and span check of hydrogen sulfide sensor.

e. Weekly, calibration check of hydrogen sulfide sensor.

f. Daily, the quantity of sodium hydroxide remaining in the abatement equipment storage tanks.

Additional entries will be made when significant changes in the resource occurs and when changes are made in injection rates of sodium hydroxide. The aforementioned daily records a., b., and c. shall also be reported daily to the Department of Health by telephone no later than noon of the following work day. The Department of Health may at any time request additional data or revise the frequency of this daily telephone reporting requirement.

The records shall be kept at the well location at all times during the drilling and flow testing operations and shall be made available upon request by the Department of Health or its duly authorized representative. Copies or summaries of the records shall be provided within a reasonable time upon request by the Department of Health. The records shall be retained for at least three years following the date of such records.

16. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be operational prior to commencement of construction.

17. The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practical. Should any inadvertent releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases exceed ten (10) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds ten (10) minutes in duration, the permittee shall take immediate action to shut-in the well.

Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

18. Steam production rates and hydrogen sulfide concentrations shall be measured to determine hydrogen sulfide emissions in pounds per hour. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations. A

specific chemical treatment plan shall be submitted to the Department of Health prior to the commencement of flow testing. A copy of the plan shall be maintained at the site at all times and supervisory personnel shall be aware of its provisions at all times.

19. The permittee shall promptly notify the Department of Health should any toxic emissions be encountered of public health concern and where dispersion into the ambient air was the mitigative action.

20. The permittee shall perform once on each well, testing and analyses for all of the following constituents of the steam condensate, steam, particulates and/or gases emanating from each well:

STEAM CONDENSATE/TOTAL STEAM	GAS PHASE
Benzene	Benzene
Ammonium (Total)	Hydrogen Sulfide
Arsenic	Ammonia
Lead	Radon 222 and daughters
Cadmium	Mercury Vapor
Bicarbonate and Carbonate	Methane
Sulfates	NonMethane Hydrocarbons
Chlorides	Carbon dioxide
Nitrates	Sulfur dioxide
Boron (Total)	NESHAPS - pollutants as requested
Hydrogen Sulfide (Total)	
Fluorides (Total)	
Total Sulfur	
Mercury (Total)	
pH	
Total Dissolved Solids	
Total Suspended Solids	
Percent Noncondensibles	

21. The drilling rig diesel engine generators and pumps shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5 percent by weight. The permittee shall maintain records on the total amount of fuel oil consumed by all the diesel engines for the drilling of each well. The total gallons of fuel oil consumed shall be submitted to the Department of Health at the completion of each well.

22. Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second. Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation

in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

In no case shall any well venting coincide with any pipeline cleanouts or well flow testing operations, or commence if the power plant emergency steam release facility is being utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

23. Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 139 micrograms per cubic meter of air, the permittee shall take immediate action to the extent practical to reduce all wellfield emissions. Within four (4) hours of the exceedance, the permittee shall reduce all wellfield hydrogen sulfide emissions associated with wellfield construction operations, including but not limited to drilling, flow testing, venting, etc., by a minimum of 50 percent of the level during the event. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 139 micrograms per cubic meter (one-hour average), the permittee shall cease all drilling operations and shut-in all wells under construction, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 139 micrograms per cubic meter (one-hour average).

The permittee shall submit to the Department of Health a written follow-up report within two (2) days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

24. The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 139 micrograms per cubic meter on a one-hour average.

25. The permittee may be required to install a control system acceptable to

the Department of Health for the rapid throttling of steam flow and well shut-in on each developmental well prior to the well being connected to a resource distribution system. The requirement for a control system may be so specified in the subsequent Permit to Operate.

26. To prevent well blowouts, the permittee shall employ good drilling practices with proper blowout prevention equipment and experienced personnel in the drilling of the exploratory/developmental wells. Drilling supervisors shall be certified in blowout prevention at a minimum of once every two years by a recognized training center. In the unlikely event of a well blowout, the permittee shall immediately proceed with measures to kill or gain control of the well and notify the Department of Health.

    The permittee shall submit to the Department of Health a written report within five (5) days of the blowout. The report shall include, as a minimum, the probable cause of the blowout, the actions that have or will be taken, the estimated time before the well is controlled, an analysis of the air quality impact from the unabated emissions, and a monitoring plan to determine the actual air quality impact resulting from the blowout. A status report shall be submitted to the Department of Health on a weekly basis until such time the control of the well is established.

DRAFT: PGV-Power Plant
September 25, 1989

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

A0961NH
File #834

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Authority to Construct (ATC) No. A-834-XXX
Application for ATC No. A-834
Expiration Date: (will be valid for 2 years)

An Authority to Construct in accordance with Administrative Rules, Title 11, Chapter 60, is hereby issued to Puna Geothermal Venture for a 25 MW Geothermal Power Plant located at TMK: 1-4-01:2 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. The issuance of this permit is based on the plans, specifications, and additional information that you submitted as part of your application dated March 24, 1989 and the subsequent information submitted on June 9, 1987.

The Authority to Construct is issued subject to the conditions set forth in Attachments I and II.

Also enclosed is Form AS-P-3, Application for Permit to Operate a Facility. Please submit this application with the applicable filing fee sixty (60) days before the end of construction. In addition, you must submit to the Department in writing the notification of completion of construction. The Authority to Construct must remain in effect until the Permit to Operate is granted or denied.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

Enclosures
cc: PIE
DHSA, Hawaii

ATTACHMENT I. STANDARD CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-834-XXX
APPLICATION NO. A-834

This permit is granted in accordance with the State of Hawaii Administrative Rules, Title 11, Chapter 60, Air Pollution Control, and is subject to the following standard conditions:

1. This permit is non-transferable from person to person, from place to place, or from one piece of equipment to another.

2. This permit is automatically void if construction has not begun within one year of the date of issuance or if the work involved is suspended for one year or more.

3. This permit is automatically void when a Permit to Operate is issued or denied.

4. The facility covered by this permit shall be constructed as specified in the application for Authority to Construct. There shall be no deviation unless additional or revised plans are submitted to and approved by the Department.

5. This permit is not a guarantee that the facility will receive a Permit to Operate at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules, Regulations, and Orders of the Department.

6. This authority, (a) shall not in any manner affect the title of the premises upon which the equipment is to be located, (b) does not release the permittee from any liability for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment, (c) does not release the permittee from compliance with other applicable statutes of the State of Hawaii, or with applicable local laws, regulations, or ordinances, and (d) in no manner implies or suggests that the Department, or its officers, agents, or employees, assumes any liability, directly or indirectly, for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the proposed equipment.

7. The Department is to be notified promptly in writing upon completion of the construction or installation of any equipment for which an Authority to Construct has been issued.

8. The operation of this equipment is sanctioned by this Authority to Construct provided that the permittee has completed the following:

   (a) Submittal of written notification of completion of construction or installation to the Department;

   (b) Submittal of Permit to Operate Application, Form AS-P-3, to the Department; and

   (c) Adherence to all applicable "special conditions" as included in the Authority to Construct.

ATTACHMENT II. SPECIAL CONDITIONS

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. The total fugitive isopentane emissions from all ten (10) Ormat Energy Converter (OEC) modules shall not exceed 0.4 lbs/hr or exceed 1000 ppm from any seal, flange, valve or any other fugitive emission point when measured from a distance of two (2) inches from the point. The permittee shall perform measurements on all fugitive isopentane emission points, as a minimum, on a weekly basis. The permittee shall take immediate corrective actions upon identifying any isopentane emissions in excess of 1000 ppm when measured from a distance of two (2) inches.

3. Records shall be maintained on all isopentane emission measurements, the amount of gallons of isopentane purchased, the amount of isopentane transfered to and from the OEC modules, and the amount of isopentane released to the atmosphere. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records. A report on the amount of isopentane released to the atmosphere shall be submitted to the Department of Health on an annual basis.

4. The geothermal fluids injection system shall include at least two (2) geothermal injection wells, a spare fluid pump, and a spare noncondensable gas compressor. The backup injection system equipment shall be maintained in good operating condition at all times and shall be utilized immediately upon identification of any malfunctioning equipment.

   In the event of an equipment malfunction or upset condition which results in a situation where the two geothermal injection wells are not capable of handling the total geothermal resource being utilized by the power plant, the power plant production and the associated geothermal resource being used shall be immediately reduced accordingly to the handling capacity of the two injection wells.

5. The diesel engine generator and the diesel firewater pump shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5% by weight.

6. Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second. In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

7. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement. Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 139 micrograms per cubic meter of air on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of the exceedance.

   Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

8. At the discretion of the Director of Health the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

9. All access roads into the permittee's property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during plant operations.

10. The emergency steam release facility, consisting of two (2) rock mufflers, chemical storage tank(s) and associated equipment, shall be installed, maintained, and be fully operational prior to commencement of plant operations. Each rock muffler shall be capable of handling a steam flow rate of 570,000 lbs/hr or 100 percent of the total power plant steam flow, whichever is greater.

11. The emergency steam release facility shall only be utilized under one or more of the following conditions:

    a) Failure of the electrical transmission lines out of the power plant or some incident that tripped all the steam turbines and OEC units;

    b) Complete upset of the geothermal fluid injection system;

    c) Pressure in the steam lines exceeds safety design set points; or

    d) Any upset situation which would otherwise result in a release of unabated steam to the atmosphere.

12. The emergency steam release facility shall be equipped and maintained at all times with a minimum three-day operating storage capacity of sodium hydroxide. The chemical abatement system shall operate automatically when steam is released through the rock muffler(s). The hydrogen sulfide concentrations shall be continuously monitored both downstream and upstream of the chemical injection point. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations.

    Upon utilizing the emergency steam release facility, the permittee shall take immediate action to the extent practical to reduce the steam flow and perform the necessary corrective actions. The steam flow rate shall be reduced, as a minimum, to 50 percent of full flow within four (4) hours after initiating the use of the emergency steam release facility.

13. The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

14. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be fully operational prior to commencement of construction.

15. Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 139 micrograms per cubic meter of air, the permittee shall take immediate action to the extent practical to reduce all power plant emissions. Within four (4) hours of the exceedance, the permittee shall terminate all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 139 micrograms per cubic meter (one-hour average), the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the ambient concentration is below 139 micrograms per cubic meter after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 139 micrograms per cubic meter (one-hour average).

    The permittee shall submit a written report to the Department of Health within two (2) days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order.

16. The operation of the 25 MW geothermal power plant, during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 139 micrograms per cubic meter on a one-hour average at or beyond the project boundary.

17. During normal power plant operations, the 25 MW geothermal power plant shall not cause an increase in the ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background at or beyond the project boundary.

18. For any hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that the 25 MW geothermal power plant did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average) or had experienced an operational upset, equipment failure or malfunction.

19. During normal power plant operations, the hydrogen sulfide emissions from the 25 MW geothermal power plant shall not exceed five pounds per hour (three-hour average). During periods of malfunction or regularly scheduled maintenance, best available control technology shall be applied for the hydrogen sulfide emissions.

20. The Department of Health may at any time with reasonable cause, request the permittee to install, operate, and maintain emission monitors to continuously measure and record the hydrogen sulfide and isopentane emissions at any specified location in the power plant.

Planning Commission

Bernard K. Akana
Mayor

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

CERTIFIED MAIL

October 3, 1989

Maurice A. Richard, Hawaii Regional
Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, HI 96720

Dear Mr. Richard:

Geothermal Resource Permit Application (GRP 87-1)
Puna Geothermal Venture - 25 MW (net) Development
Kapoho, Hawaii TMK: 1-4-01: por. 2, 3, por. 19, & 58

The Planning Commission at its duly held meeting on September 19, 1989, considered this Geothermal Resource Permit Application and based on the following findings, approved the project consisting of 10 integrated back-pressure steam turbine and air-cooled binary cycle turbine power generating modules; up to 30 geothermal wells drilled from 6 well pads; brine and steam pipelines, pollution control equipment; a brine surge tank and holding pond; a switchyard; an office, warehouse, workshop, and control buildings; access roads; and auxiliary facilities such as air compressors, fire protection equipment, etc.:

1. The proposed geothermal development activities would not have unreasonable adverse health, environmental, or socio-economic effects on residents or surrounding property.

The project will occupy approximately 25 acres of surface area within a dedicated 500-acre project area located within the Kapoho Section of the Kilauea Lower East Rift Geothermal Resource Subzone. Approximately 2.75 acres of land will be cleared and leveled for each of 6 drill pads. Each drill site will be engineered to support the drilling equipment and to keep drilling effluent contained onsite and separate from any natural drainage. Each well pad will have drilling mud pits; sumps with gently sloped walls used to temporarily store drilling wastes which typically consist of rock cuttings, waste drilling mud,

cement particles, lost-circulation material and other drilling mud additives, and other waste drilling liquids. The high porosity of the volcanic soils and rock in the site area results in rapid downward percolation of rainwater. Concrete pads and berms will be provided to contain possible spills in areas where chemicals are handled. Catch basins, culverts, ditches, and berms will be provided for drainage control.

There are no surface streams or ponds in the vicinity of the proposed drill sites. Ground water will be protected by cementing casing into the hole to depths below sea level.

Based upon biological surveys and monitoring of the Hawaiian Hawk, there are no endangered native species in the project site; however, other wildlife and natural resources will be affected by loss of habitat at the drill site and along any access roads that will be constructed. This habitat loss will be limited to what has been described as scrub vegetation and fallow fields where the primary vegetation is non-native weedy vegetation and abandoned papaya orchards.

Unabated geothermal emissions will be vented to the atmosphere during well cleanout and pipeline clearing. Noise will be generated during well drilling, construction, and operational phases of this project. The sites have been located in agricultural areas away from urban population concentrations. The sites will also be located to take advantage of existing topography and vegetation to muffle or block noise from the drilling operations. The drilling area will be within an area designated as a "hard hat" area. The general public will not be permitted within this area. Average drilling time for each well will be approximately 45 days, with up to five wells drilled at each well pad.

The socio-economic impacts of this activity would not be unreasonable. This project will provide a dependable source of electricity yet decrease dependence on imported petroleum products; provide more employment opportunities; increase personal income and public revenues; and further the informational base to support decisions leading to energy self-sufficiency. This project will support goals stated in the County's General Plan's Energy Element. The economic benefits and security implications of reducing Hawaii's dependence on imported fuels for energy production have been recognized for a long period of time at all levels of government. This has

resulted in a general policy of support for alternative energy research and development. The establishment of Geothermal Resource Subzones, where exploration and development are allowable activities, acknowledges the potential higher use of the lands in volcanic rift zones which are generally of marginal value for agriculture and other cultural uses. Indigenous geothermal resources will be developed for the general social and economic well-being of the residents of Hawaii.

2. The proposed geothermal development activities would not unreasonably burden public agencies to provide roads and streets, sewers, water, drainage, school improvements, and police and fire protection.

There should be negligible impact on public infrastructure and services. Personnel associated with the drilling and operations will be small in number. Most of the estimated 23 construction and 19 operations and maintenance jobs at the proposed project will be filled by local employees. Peak construction employment is estimated to be as high as 100. These people will utilize existing facilities and will not require additional services that are not already provided by the County.

Traffic through Pahoa will increase especially during construction. An estimated 35 vehicle round trips per day are expected during wellfield and power plant construction. During normal power plant operations, the traffic generated will fall to about 10 to 18 vehicle round trips per day. These added vehicle trips should not add significantly to the existing traffic levels of 2000 to 3600 vehicles per day at the intersection of the Pahoa to Kalapana Road (Hwy 130) and the Pahoa to Kapoho Road (Hwy 132).

Drilling and power plant operations will require no provisions from public agencies in the form of roads or streets, sewers, drainage, or school enlargement or improvements, and only the normally afforded police and fire protection will be expected. Any necessary access roads will be constructed by the applicant, and water for drilling will be purchased from the Department of Water Supply from their existing distribution system or the applicant will develop its own water supply.

This project will have its own fire protection system and will place minimal demands on the Hawaii County Fire Department. Fire extinguishers are standard equipment on drilling rigs to control fires associated with drilling operations. Water used in drilling can also be used to extinguish any fires that may develop. In addition, drilling muds can be pumped onto any fire that may develop in the vicinity of the rig.

At this time, cesspools are planned as the disposal method of approximately 200 gallons per day of domestic wastewater. This or an alternative disposal method will need to be approved by the the State Department of Health.

3. There are reasonable measures available to mitigate the unreasonable adverse effects or burdens referred to above.

There are mitigation measures to ensure the integrity of the geothermal wells and to prevent blowouts; including the use of blowout prevention equipment that can rapidly choke off the flow of fluids from the well during drilling; the use of conservative safety factors in designing wells and wellhead equipment; the installation of two strings of steel casing cemented in place from the surface into the reservoir caprock; the use of premium grade casing materials and connections to strengthen the wellbore; special cement mixtures with high strength and insulating properties; and regular inspection procedures to test the integrity of the casing and equipment.

Hydrogen sulfide monitors will be operable at the drill site and at off-site locations. The applicant will comply with all federal, state, county, or local rules regarding environmental monitoring.

During drilling and power plant operations, noise levels will be monitored at several sites at and adjacent to the project, and mitigating measures including the relocation of affected individuals will be taken if noise levels exceed acceptable levels.

The drillers will receive safety instructions and instructions on how to contact emergency facilities in the area. Phone numbers for police, fire department, hospital, and other emergency services will be posted in a prominent place at

the drill rig, together with phone numbers for the drill supervisor, principal investigator, field manager, and appropriate state and county regulators.

As drilling will be conducted on a 24 hours-a-day, 7 days-a-week basis, the drill site will be lighted during the hours of darkness to permit continuous operations and to provide safe working conditions. The rig will be sited so as to be as unobtrusive as possible and will conform to all Hawaii outdoor lighting regulations. Copies of Hawaii Outdoor Lighting Regulations will be provided to the drilling contractor to insure compliance. After the rig is operational, a lighting survey will be made, and lights adjusted or shielded as necessary to cause the minimum impact.

The power plant site will be more than 2000 feet away from the residents in Lanipuna Gardens and Pohoiki Bay Estates and more than 3400 feet away from the residents in Leilani Estates. There are six residences within a half-mile and another 24 residences within a mile of the power plant site. The relatively close distance between the project and residents prompts the developer to employ the most effective air and noise emission measures.

During normal power plant operation, except for fugitive leaks, geothermal fluids including H2S will not be released to the atmosphere. During outages, steam will be released through rock mufflers after being treated to control the levels of H2S being emitted into the atmosphere. This abatement will keep the H2S concentration below levels known to cause health effects. H2S levels will be monitored to verify the predicted impacts of this project.

Also during normal power plant operation, noise levels will be reduced to meet the Planning Commission's guidelines. Attenuation includes employing engineering measures which range from cooling fan design and building material selection to siting the power plant within the saddle of the the adjacent puu's, orientation of noise emission sources away from receptors, the use landscaping features such as vegetation and berms, etc. In addition noise levels in the community will also be monitored to verify the predicted impacts.

Based on the above, we have concluded that the proposed Geothermal Resource Permit Application has demonstrated that it is

consistent with the criteria for issuance of Geothermal Resource Permits as contained in Rule 12-6 of the Planning Commission Rules and Chapter 205-5.1(e), Hawaii Revised Statutes, subject to the following conditions:

1. This Geothermal Resource Permit grants approval for those uses and improvements described in the "Geothermal Resource Permit Application Amendment for the Puna Geothermal Venture Project," dated March 1989, except as amended, modified, or conditioned by this Geothermal Resource Permit. Except as otherwise described in this permit, no other uses are authorized by this permit, and any proposed other uses of the geothermal resource or improvements to the land, whether to be conducted by the permittee or a third-party under contract to, or other agreement with, the permittee, shall be subject to prior review and approval, consistent with the applicable Rules of Practice and Procedure of the Hawaii County Planning Commission. The Planning Director may, upon written request of the permittee, approve deviations from the project layout and uses permitted under this Geothermal Resource Permit if such amendments are consistent with the uses permitted and conditions of this Geothermal Resource Permit. No action pursuant to any such request for deviation by the permittee shall be taken without the written approval of the Planning Director. Amendments to the Geothermal Resource Permit and its conditions may be granted pursuant to Article 12-9 of the Rules of Practice and Procedure of the County of Hawaii Planning Commission.

2. The permittee, its successors, or assigns shall be responsible for complying with all of the stated conditions of approval of this Geothermal Resource Permit. Should the Planning Director determine that there is noncompliance with the Geothermal Resource Permit or its conditions, the permittee may be subject to enforcement of the Geothermal Resource Permit conditions and penalties pursuant to Sections 12-10 and 12-11 of Rule 12 of the Rules of Practice and Procedure of the County of Hawaii Planning Commission.

3. The permittee shall grant unrestricted access to the subject property(ies) to authorized governmental representatives or to consultants or contractors hired by governmental agencies for inspection, enforcement, or

monitoring of activities subject to or authorized by this Geothermal Resource Permit. A designated employee shall be available at all times for purposes of supplying information and responses deemed necessary by the authorized governmental representative in connection with such work.

4. During the period of construction of the project, or during the drilling or testing of any well, the permittee shall submit a weekly written status report to the Planning Department which shall include:

   a. A brief description of the work undertaken during the previous week under the Geothermal Resource Permit;

   b. A description of the work being proposed during the next week under the Geothermal Resource Permit; and

   c. Any other information that the Planning Department may reasonably require which addresses the immediate environmental and regulatory concerns of the County of Hawaii or the requirements of the Geothermal Resource Permit.

5. The permittee shall submit a written semiannual status report to the Planning Department by February 15 (covering the preceding period of July 1 through December 31) and August 15 (covering the preceding period of January 1 through June 30) of each year. The status report shall include, but not be limited to:

   a. A brief summary of the work undertaken during the current reporting period under the Geothermal Resource Permit;

   b. A brief summary of the work being proposed over the next reporting period under the Geothermal Resource Permit;

   c. The results and analysis of all environmental monitoring activities undertaken as required by this Geothermal Resource Permit;

   d. A log of any complaints received by the project and the responses thereto; and

e. Any other information that the Planning Department may reasonably require which addresses the environmental and regulatory concerns of the County of Hawaii or the requirements of the Geothermal Resource Permit.

6. If any environmental monitoring data collected as required under this Geothermal Resource Permit indicates that project operations are creating, or have the immediate potential of creating, excessive health or environmental effects not otherwise permitted by this Geothermal Resource Permit, the permittee shall submit such data to the Planning Department within 48 hours of its identification.

7. The permittee shall maintain a record in a permanent form suitable for inspection and shall make such record available on request to the Planning Director or his designee. The record shall include:

a. Occurrence and duration of any start-up, shut-down, and operation mode of each geothermal well and/or facility;

b. Performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous monitor(s) that have been installed; and

c. All measurements reported in units compatible with applicable standards/guidelines.

8. Prior to the commencement of any grubbing or grading activity, the permittee shall:

a. Submit a metes and bounds description of all lands to be disturbed including but not limited to all roadways, well pads, steam gathering system corridors, injection system corridors, power plant site, and transmission line corridors to Planning Director;

b. Mark the boundaries of these sites to be disturbed in the field; and

c. Comply with all requirements of Chapter 10 Erosion and Sedimentation Control, Hawaii County Code (the County grading ordinance).

9. No construction or transportation equipment shall be permitted beyond the prescribed boundaries of the areas to be disturbed.

10. Prior to commencing any geothermal well drilling, testing, production, or injection activity approved under this Geothermal Resource Permit, the permittee shall submit to, and secure the approval of, the Planning Director of a hydrologic monitoring program. The program shall, at a minimum, provide for the quarterly monitoring of water levels and appropriate chemical species from existing wells completed within the shallow aquifer in those areas downgradient of the project area, including the Green Lake water supply, as well as from a well located within the project boundary and completed within the shallow aquifer. The monitoring, sampling, and analysis protocols shall be clearly defined in the program submitted to and approved by the Planning Director. The monitoring and sampling shall be conducted by a qualified contractor, and the samples analyzed by a qualified laboratory, selected by the permittee but subject to the approval of the Planning Director. The selected contractor and laboratory shall operate under contract to, and shall be funded by the permittee. The program shall monitor the shallow groundwater immediately prior to, and during, all periods of well drilling, testing, production, and injection activity approved under this Geothermal Resource Permit. The data obtained shall be submitted to the Planning Director in accordance with the requirements contained in this Geothermal Resource Permit for submittal of all collected environmental monitoring data. The County shall make random checks of the ground water supply no less than every two months.

11. If pollution of the shallow ground water is demonstrated to be occurring from the project construction, operation or maintenance activities as determined by the Planning Director in consultation with the Department of Water Supply and the Department of Land and Natural Resources, the permittee shall immediately take those measures necessary to eliminate the source of the pollution meeting with the approval of the affected agencies. If any geothermal production or injection well demonstrates that the integrity of the well casing is lost such that the shallow groundwaters are being, or may immediately be

polluted by the production or injection activity of that well, the permittee shall, as quickly as practical consistent with safety and prudent operating practices, cease the production or injection activity for that well, and the activity not resume for that well until adequate casing integrity is restored to the satisfaction of the Department of Land and Natural Resources.

13. In the event the Department of Water Supply determines that the existing Green Lake county water source becomes contaminated by the permittee's geothermal wellfield system, the permittee shall immediately provide alternative(s) to the water supply, including the hauling of water if necessary as a temporary alternative, which meet the approval of the County's Department of Water Supply and the State Department of Health.

14. Only nonhazardous drilling mud additives, as recognized on the "California Department of Health Services Drilling Mud Additives Used in Nonhazardous Drilling Muds and Fluids" list, shall be used during the drilling of the geothermal wells, and which list shall be on file with the County Planning Department.

15. All drilling mud solids and drill cuttings shall be discharged to and contained within the well pad sump. A disposal site or sites approved by the State Department of Health, prior to any disposal activity covered by this permit, shall be provided for sump contents and other waste materials to be disposed of from the drilling activity. All sumps/ponds shall be purged in a manner meeting with the approval of the State Department of Health. In the event there are no DOH requirements, the applicant and the Planning Department shall request for guidelines from the DOH for the purging of sumps and ponds. Said guidelines shall be available to the community.

16. All geothermal brines, steam condensate, and noncondensible gases produced during normal project operations shall be injected into the geothermal reservoir.

17. Prior to commencing any activity approved under this Geothermal Resource Permit on the project site, the permittee shall submit to, and secure the approval of, the Planning Director of an air quality and meteorological

monitoring program. The program shall include provisions for installation, calibration, maintenance and operation of recording instruments to measure air contaminant concentrations, the specific elements to monitored, the number of stations involved, and frequency of sampling and reporting. The Planning Director shall review and approve the submitted monitoring plan in consultation with and concurrence of the State Department of Health. The monitoring and sampling shall be conducted by a qualified contractor, and the samples analyzed by a qualified laboratory, selected by the permittee but subject to the approval of the Planning Director. The selected contractor and laboratory shall operate under contract to, and shall be funded by the permittee. The program shall monitor the air quality immediately prior to, and during, all periods of well drilling, testing, production, and injection activity approved under this Geothermal Resource Permit. The data obtained shall be submitted to the Planning Director in accordance with the requirements contained in this Geothermal Resource Permit for submittal of all collected environmental monitoring data.

18. The permittee shall apply "Best Available Control Technology" (BACT) for air emissions to all aspects of the project to minimize air quality impacts. BACT means the maximum degree of control for air quality concerns taking into account what is known to be practical and economically viable. BACT for each aspect of the project shall be determined by the Planning Director in consultation with other appropriate governmental agencies involved in the control or regulation of air quality from geothermal development projects. Such determination shall be made prior to issuance of any construction permit for that aspect of the project. BACT shall be subject to review by the Planning Director every five years, commencing with the date of approval of the Geothermal Resource Permit for the wellfield operations, and with the date of full power plant operation for the power plant.

19. The permittee shall control all project emissions of hydrogen sulfide during normal power plant operation so that the increase in the ambient hydrogen sulfide concentration due to these project emissions shall not exceed 5 ppb at or beyond the project boundary.

20. With regard to air emissions, the permittee shall submit to the County Civil Defense and the Planning Department a map and accompanying text that describes predetermined "worst case" impacted areas.

21. Prior to commencing any activity approved under this Geothermal Resource Permit on the project site, the permittee shall submit to, and secure the approval of, the Planning Director of a noise monitoring program designed to adequately ensure project compliance with the noise impact limitations contained in this Geothermal Resource Permit. The program shall include the monitoring of noise immediately prior to and during all periods of activity approved under this Geothermal Resource Permit. The monitoring and sampling shall be conducted by a qualified contractor, and the samples analyzed by a qualified laboratory, selected by the permittee but subject to the approval of the Planning Director. The selected contractor and laboratory shall operate under contract to, and shall be funded by the permittee. This program should also allow the correlation of any complaints of noise from the public with the level of measured noise, the meteorological conditions, and the type of operations which occurred at the site. The data obtained shall be submitted to the Planning Director in accordance with the requirements contained in this Geothermal Resource Permit for submittal of all collected environmental monitoring data.

22. The permittee shall apply "Best Available Control Technology" (BACT) for noise emissions to all aspects of the project to minimize project noise. BACT means the maximum degree of control for noise concerns taking into account what is known to be practical and economically viable. BACT for each aspect of the project shall be determined by the Planning Director in consultation with other appropriate governmental agencies involved in the control or regulation of noise from geothermal development projects. Such determination shall be made prior to issuance of any construction permit for that aspect of the project. BACT shall be subject to review by the Planning Director every five years, commencing with the date of approval of the Geothermal Resource Permit for the wellfield operations, and with the date of full power plant operation for the power plant.

23. The permittee shall notify the Planning Department and any resident within 3500 feet of the permittee's project boundary who has previously requested such notice, at least twenty-four (24) hours in advance of the open venting of each geothermal well and pipeline cleanout and 14 days before commencement of drilling. Initial notification to residents shall be made in writing, offering the opportunity to be placed on the notification list. Any other person may request to be on the list. The permittee shall notify the Planning Department immediately prior to the open venting of any geothermal well and pipeline cleanout. The permittee shall notify the Planning Department following completion of each geothermal well, prior to the demobilization of the drilling rig.

24. Until such time as noise regulations are adopted by the State or County, the permittee shall comply with the following guidelines which shall be enforced by the Planning Department:

a. During power plant and wellfield operations, the permittee shall not exceed a general noise level of 55 dBA during daytime and 45 dBA at night at the current nearest residence. For the purposes of these guidelines, "night" is defined as the hours between 7:00 p.m. and 7:00 a.m.;

b. The allowable noise levels may be exceeded by a maximum of 10 dBA; however, in any event, the generally allowed noise level should not be exceeded more than 10 percent of the time within any 20-minute period, and the permittee shall conduct all operations so as to minimize the occurrence, frequency, and duration of this impact noise;

c. The noise level guidelines specified above shall be waived only for the specified duration of authorized open geothermal well venting from all wells, steam pipeline cleanout periods, and the drilling and testing of wells from well pads E and F. During these authorized periods, BACT shall be applied. In addition, during the drilling and testing of wells from well pads E and F, the permittee shall meet a general noise level of 55 dBA during the day and 50 dBA during the night at the current nearest residence; and

d. For the purposes of these noise conditions, the "nearest residence" is hereby defined as: For three years following the date of granting of the Geothermal Resource Permit, that permanently occupied dwelling nearest the applicable noise emission point as of the date of the granting of this permit; for all following years, that permanently occupied dwelling nearest the applicable noise emission point.

e. Sound level measurements shall be conducted using standard procedures with sound level meters using the "A" weighting and "slow" meter response unless otherwise stated.

25. Pursuant to Article 12-8 of the Rules of Practice and Procedure of the County of Hawaii Planning Commission, prior to initiating construction of the project, the permittee shall submit the following to the Planning Director:

a. Copies of approved permits and other applicable approvals for the project from other county, state, or federal agencies as applicable;

b. Final plans or provisions for monitoring environmental effects of the project as required by this Geothermal Resource Permit or otherwise required to ensure compliance with County rules and the rules of the State Department of Health and Board of Land and Natural Resources and other permit-issuing agencies;

c. A final plan of action to deal with emergency situations which may threaten the health, safety, and welfare of the employees and other persons in the vicinity of the proposed project site; and

d. A final site plan and elevations of proposed temporary and/or permanent structures for the project.

26. Prior to commencing any activity approved under this Geothermal Resource Permit on the project site, the permittee shall submit to, and secure the approval of, the Hawaii County Civil Defense Director a final plan of action to deal with emergency situations which may threaten the

health, safety, and welfare of the employees and other persons in the vicinity of the proposed project site. The plan shall include but not be limited to, the following elements:

a. A description of the project facilities and operations, with site plans identifying areas of potential hazards, such as high pressure piping and the presence, storage and transportation of flammable or hazardous materials, such as lubrication or fuel oil, isopentane, hydrogen sulfide, and sodium hydroxide;

b. A description of emergency services available off-site to respond to any emergency;

c. A description of the current onsite chain of command and responsibilities of project personnel in the event of an emergency; and

d. A description of potential project emergency situations, such as loss of well control, chemical spills, hydrogen sulfide exposure, pipeline rupture, fires, contaminated solids, etc. identifying:

(i) technical data on the nature of the hazard (for example, the concentrations of hydrogen sulfide in the various areas and the hazard associated with these concentrations, the corrosive characteristics of the abatement chemicals), or any data regarding the possible aerial extent of each potential emergency situation;

(ii) the warning systems (such as hydrogen sulfide detectors) used to alert personnel of the hazard;

(iii) the location and use of equipment used to control the hazard (such as fire protection equipment or isolation valves) or repair hazardous equipment (such as welding equipment or casing sleeves), and safety equipment for personnel (such as respiratory packs), including identification of the personnel trained in the use of that equipment; and

(iv) provisions for the monitoring, detection, and inspection of wells and plant facilities for the prevention of emergency situations.

e. Provisions to address natural hazards (such as lava flows, earthquakes, and storms) that identify warning systems, control options, steps for securing and shutting down the facility, personnel evacuation, and notification to appropriate agencies;

f. The location and capabilities of available medical services and facilities and plans for treating and transporting injured persons;

g. Evacuation plans, including meeting points, personnel rosters, and escape routes;

h. Training requirements for personnel, including procedures for emergency shutdown, handling of emergency equipment, spill prevention, first aid and rescue, fire fighting procedures, and evacuation training;

i. Provisions for periodic emergency preparedness drills for personnel;

j. Detailed procedures to be used to facilitate coordination with appropriate federal, state, and county officials during and after any emergency situation; and

k. Procedures to be used to identify and inform all residents within applicable distances of the project of the possible emergency situations, warnings, and responses in advance of commencement of project operations and the methods by which all individuals affected by a given emergency will be notified and evacuated, as necessary.

Copies of the emergency plan shall be made available to the public by the applicant.

27. Reports and records of emergency situations shall be submitted to the Planning Department upon occurrence of such emergencies.

28. Within 48 hours after an earthquake registering 6 or above on the Richter Scale and/or within 48 hours after an eruption has occurred, all wells within 10 kilometers of the epicenter or eruptive center, shall be examined for any physical changes which would alter its downhole integrity. A report of this examination shall be filed with the Planning Department within 48 hours of the examination.

29. In the event the Hawaii County Civil Defense Agency determines that an emergency situation resulted from the permitted geothermal activity, the permittee shall bear all costs of evacuation. The Hawaii County Civil Defense Agency shall be responsible for public and media notification and evacuation of members of the public in the event the Agency deems such action necessary as a result of an emergency situation.

30. Prior to the commencement of any surface disturbing activity, the permittee shall conduct an archaeological survey of those areas planned for surface disturbance not previously surveyed and submit the results of this survey to the Planning Department for review and approval.

31. If construction activities expose any cultural remains, the permittee shall immediately cease work in the area of the cultural remains and contact the Planning Department and the State Historic Preservation Office. As appropriate, a qualified archaeologist shall be retained by the permittee to implement any necessary mitigation measures and monitor further work. Work in the affected area shall not resume until such time that clearance is obtained from the Planning Department.

32. The lighting used shall not interfere with the operations at the observatories located on Mauna Kea. To meet this requirement, the permittee shall comply with the requirements of Chapter 14, Article 9 of the Hawaii County Code, relating to outdoor lighting.

33. All lights shall be at a minimum level consistent with the safety of operations and shall be shielded or directed away from surrounding residential or populated areas and not interfere with important biological resources in the area.

34. The permittee shall submit to, and secure the approval of the Planning Director of a detailed landscaping and siting plan. The siting plan shall show plan and elevational views of all proposed temporary and/or permanent structures for the project. The plan shall also show the site topography, natural features and proposed berms, planting schedules, tree sizes, heights (actual size of trees to be planted), type of irrigation system, etc. Installation of approved landscaping improvements shall be commenced within three weeks from the completion of construction of each well pad, access road, or other facility. The plan shall also include:

a. A landscaping maintenance program;

b. A line-of-sight analysis, being especially sensitive to views from surrounding residences, of the view planes from the site property lines, from the intersection of Leilani Avenue and the Pahoa-Pohoiki Road, for the intersection of the proposed access road and the Pahoa-Kapoho Road, from the intersection of Lauone Street and Hinalo Street in Lanipuna Gardens, and the intersection of the Kapoho-Kalapana Road and the access road to Vacationland; and

c. To the extent possible, the well sites and power plant shall be landscaped and sited to reflect the existing agricultural character of the area, and utilize native plantings.

35. To the extent compatible with engineering and aesthetic considerations, all exterior surfaces shall be rough texture, with no reflective metal, and no reflective glass surfaces oriented toward surrounding residential or populated areas within line of sight. The exterior of all project structures, including fluid conveyance pipelines, shall be painted in colors so as to blend in with the surrounding environment.

36. The permittee shall submit and secure approval of a revegetation/site reclamation plan meeting with the approval of the Planning Director in consultation with the Forestry Division of the Department of Land and Natural Resources. When construction is completed on any individual project site, or if the project area is

abandoned, all denuded areas on and around the project site shall be revegetated in accordance with this plan. Said plan shall include appropriate security to assure its implementation in a timely manner.

37. The permittee shall obtain and maintain those bonds required for project operations by the rules and regulations of the Board of Land and Natural Resources and the Department of Health.

38. The permittee shall obtain and maintain builder's risk and comprehensive liability insurance for project construction and operation activities.

39. The permittee shall notify each resident household within a radius of 3500 feet from any geothermal well at least twenty four (24) hours prior to, and again the morning of, any planned venting of that well. Each resident within this radius of 3500 feet shall be offered the opportunity to voluntarily leave the area during the well venting. The cost of such voluntary leaving, up to a maximum of $100.00 per resident or $200.00 per household, whichever is lesser, shall be borne by the permittee. Upon adequate demonstration to the permittee that any such resident is unable to pursue his normal, legitimate employment or business activity as a result of such voluntary leaving, the permittee shall reimburse that resident for that one day's lost income, in an amount not greater than $150.00.

40. Upon adequate demonstration to the permittee that any adverse alteration of the quality of the water has occurred as a result of venting to the atmosphere, the permittee shall immediately rinse the water catchment system and replace the stored water of any water catchment system within a radius of 3500 feet of any well. Upon adequate demonstration to the permittee that any agricultural crop damage resulted directly from any of the permittee's well venting operations, the permittee shall also provide compensation to the owner of agricultural operations located within a radius of 3500 feet of that well. In either situation, compensation will only be considered if the agricultural crops and water catchment system are inventoried and registered with the permittee prior to the venting. Other requests shall be considered by the permittee on a case-by-case basis.

41. The permittee shall establish and publish a telephone number for use by local individuals for the lodging of complaints or inquiries regarding status of operations. A designated representative of the permittee shall be available, 24 hours a day, to respond to any local complaints or inquiries.

42. Large vehicle deliveries to the project site shall be limited to daylight hours. For the purposes of this condition, daylight hours is defined as the hours between 7:00 a.m and 7:00 p.m. This condition shall not apply for vehicles responding to emergencies.

43. An extension of time for the performance of conditions within the permit may be granted by the Planning Director upon the following circumstances: 1) the non-performance is the result of conditions that could not have been foreseen or are beyond the control of the applicants, successors, or assigns and that are not the result of their fault or negligence; 2) granting of the time extension would not be contrary to the General Plan or Zoning Code; 3) granting of the time extension would not be contrary to the original reasons for the granting of the Geothermal Resource Permit; and 4) the time extension granted shall be for a period not to exceed one (1) year and 5) if the applicant should require an additional extension of time, the Planning Director shall submit the applicant's request to the Planning Commission for appropriate action.

44. All other applicable rules, regulations, and requirements, including those of the State Department of Health and the State Department of Land and Natural Resources shall be complied with.

45. The permittee shall obtain, and comply with the provisions of, permits to drill, modify use or abandon, as appropriate, from the State Board of Lands and Natural Resources for each geothermal well approved under this Geothermal Resource Permit.

46. The permittee shall obtain and comply with the provisions of, Underground Injection Control Permits, as appropriate, from the State Department of Health for all geothermal injection wells approved under this Geothermal Resource Permit. A copy of the UIC Permit and any conditions shall be available in the County Planning Department.

47. The permittee shall obtain, and comply with the provisions of, Authorities to Construct and Permits to Operate from the State Department of Health for all applicable project operations approved under this Geothermal Resource Permit.

48. The permittee shall secure all necessary approvals and clearances including Plan Approval pursuant to Chapter 25 of the Hawaii County Code, within one (1) year from the effective date of the Geothermal Resource Permit.

49. Construction shall commence within one (1) year from the date of receipt of Final Plan Approval.

50. The permittee shall submit a written semiannual status report to the Planning Commission on the permittee's best efforts to address/comply with the "Other Agreements and Recommendations" as contained in Section 5 of the final report on "Mediation of Geothermal Resource Permit Application 87-1" dated August 21, 1989, regarding but not limited to the collateral agreements and commitments the permittee made during the mediation process, and which the permittee considers to be contractual obligations subject to the issuance of a satisfactory Geothermal Resource Permit. The status report shall be submitted by February 15 (covering the preceding period of July 1 through December 31) and August 15 (covering the preceding period of January 1 through June 30) of each year.

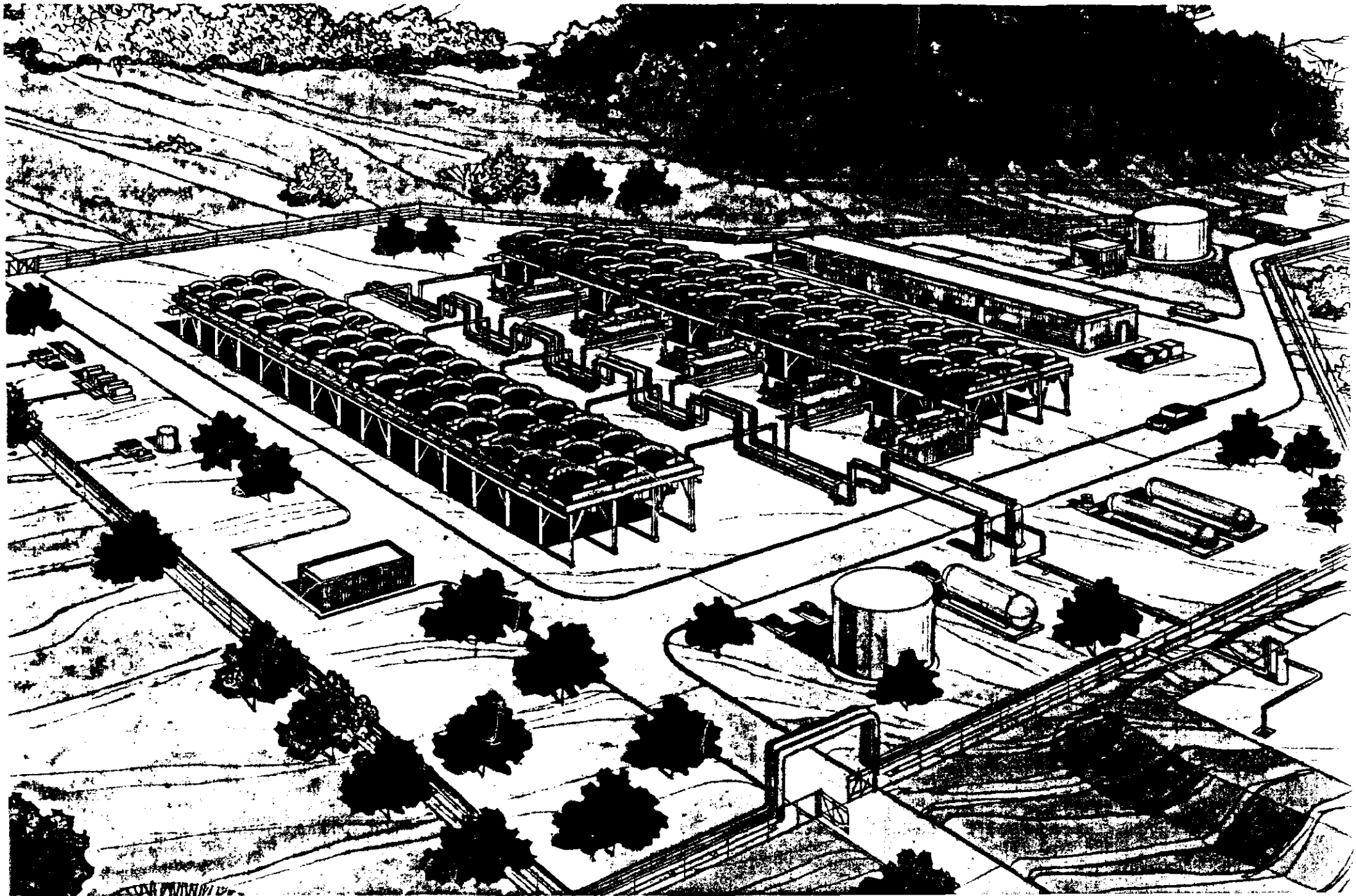
51. Prior to the issuance of the first building/construction permit under this Geothermal Resources Permit (GRP) by the County of Hawaii, the State of Hawaii and the permittee shall each contribute towards a Geothermal Asset Fund or other appropriate existing fund for the purposes of geothermal impact mitigation efforts within the District of Puna. The permittee's initial contribution to the fund shall be a sum of $60,000, due within thirty (30) days after the effective date of this GRP permit, and annual sums of $50,000 due on or before the anniversary date of this GRP permit over a period of eight (8) consecutive years thereafter for a total of $460,000. Annual contributions thereafter shall be determined between the permittee and the State of Hawaii or $50,000 annually, whichever is greater. The State's initial annual contribution to the Geothermal Asset Fund shall be the net revenues derived from the resources generated by the HGP-A well, or a similar amount from other State funding sources

less any allocations entitled to the Office of Hawaiian Affairs and operations and maintenance costs. In the event that future enabling legislation provides for a percentage of the State's geothermal royalties to be allocated to the County, upon concurrence with the County Council, said royalties may also be deposited to the fund. The administration and expenditure of assets from this Geothermal Asset Fund shall be in accordance with rules, regulations and procedures developed for that purpose by the County in accordance with Chapter 91, Hawaii Revised Statutes, and with participation of Puna residents or representatives thereof, which shall include, but not be limited to, provisions and criteria to enable the first priority of distribution for temporary or permanent relocation of those property owners who are found, in accordance with criteria established in the rules, to be adversely impacted by the activities authorized, provided that such relief is applied for within a period of one (1) year of the impact. A priority list of impact mitigation projects may be established by the County Council or agency designated by the Council in conjunction with Puna residents or designated representatives thereof, with the exception of upgrading existing subdivisions in the Puna District to current subdivision standards and specifications of the County of Hawaii. Should any other district(s) of the County of Hawaii be proved to be negatively impacted by activities authorized under this or any other subsequent GRP, that district shall receive a pro rata share of the fund assets as may be determined by the County Council or agency designated by the Council with expenditures to follow a prioritized schedule determined as outlined above. The rights granted to the permittee shall not be conditioned upon any contribution or further participation by the State in the fund nor with respect to the creation, management, and operation of the fund other than set forth above.

Sincerely,

Gary Mizuno, Chairman
Planning Commission

cc: Mr. Peter Adler
Mediation Parties (list)
DBED
DOA
DLNR/Honolulu
DOH
Mr. Ralph Matsuda



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

JUN 5 1989

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Kanuha:

Thank you for the opportunity to review and comment on the application for a Geothermal Resource Permit submitted by Puna Geothermal Venture (PGV).

We have no major objections regarding the 25 MW geothermal project proposed for the island of Hawaii, but would like to offer the following comments:

1) The PGV application states that up to a maximum of 500 gallons per minute (720,000 gal/day) of water may be required for re-injection operations to maintain injection flow and to provide a sufficient quantity of fluid to absorb the noncondensable gases. It is indicated that this supplemental water may be supplied by one or two wells developed near the plant site.

   The applicant (PGV) should be advised that pursuant to the Department of Land and Natural Resources' Administrative Rules, Chapter 13-168, a well construction and pump installation permit, in addition to a well completion report will be required for the construction of any proposed water well. Futhermore, the applicant shall be required to comply with all other applicable regulations identified within that chapter.

2) Pursuant to PGV's proposal to re-inject geothermal fluids and noncondensable gases back into the geothermal reservoir, and in response to community concerns regarding potential impacts to the ground water aquifer down gradient from the site, it is recommended that if water wells are to be developed, that they be strategically sited within the project area so that they may serve as monitor wells as well as sources of supplemental water.

   Placement of these supply wells down gradient from the injection well sites will allow for periodic sampling of the existing ground water aquifer and the monitoring of the proposed injection operations.

3) It is futher recommended that the applicant file monthly reports of re-injection data, including but not limited to, quantity of fluids injected, chemical composition, and any changes in injection pressures which may indicate that the injected fluid is no longer confined to the intended zone of injection.

4) All work shall be performed in accordance with the Department of Land and Natural Resources' Administrative Rules (Chapters 13-183 and 13-184), and all other applicable Federal, State, and County laws, ordinances, rules and regulations pertaining to the lands and permittee's operations including, but not limited to, all water and air pollution control laws, and those relating to the environment.

5) If any unanticipated sites or remains of historic or prehistoric interest (such as shell, bone, or charcoal deposits, human burials, rock or coral alignments, paving, or walls) are encountered during the applicants operation, the applicant shall stop work and contact the State Historic Preservation Office at 548-7460 or 548-6408 immediately.

Thank you again for the opportunity to comment on the subject application and should you have any questions, please contact Dan Lum at 548-7643.

Very truly yours,

WILLIAM W. PATY

LW
c- Soho

ORMAT®

May 22, 1989
Reference No. 89141

Mr. William Paty
Chairman
Board of Land and Natural Resources
Kalanimoku Building, #130
1151 Punchbowl Street
Honolulu, Hawaii 96813

Subject: Well Modification Permit Request

Reference: Geothermal Well: Kapoho State #1-A
Geothermal Resources Mining Lease R-2
Location TMK 1-4-01:02 Kapoho, Puna District,
Hawaii County Leased to Kapoho Land Partnership

Dear Mr. Chairman:

A Department of Land and Natural Resources (DLNR) permit exists for the drilling and completion of the reference well. Since the conclusion of drilling and flow testing in 1985, Kapoho State #1-A has been maintained in a shut-in status with periodical gas cap ventings and incineration or burning of the exhausted gases. Puna Geothermal Venture (PGV) has closely monitored this well and complied with DLNR reporting requirements.

Puna Geothermal Venture herewith submits a Well Modification Permit request consistent with Chapter 183 of Title 13, Subchapter 183-65-4.

The attached work description and well casing configuration drawing including the approximate location of the proposed cement plug is attached for reference.

In brief, the PGV request is based on a technical need to periodically service the wellhead assembly to maintain a high standard of reliability and integrity. This routine servicing process is also timed to fit within the overall 30 MW development schedule and expected County permitting approvals and related requirements now in progress.

PUNA GEOTHERMAL VENTURE

☐ 101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720 • Telephone (808) 961-2184 • Facsimile (808) 961-353
☐ 610 East Glendale Ave., Sparks, Nevada 89431-5811 • Telephone (702) 356-9111 • Facsimile (702) 356-912

Your early consideration and approval will be appreciated. Please contact the Hilo office of Puna Geothermal Venture if you or your staff have any questions about the above request.

Sincerely,

Maurice A. Richard
Hawaii Region
Development Manager

Attachment

MAR/ci

11 May 1989

Program to Temporarily Suspend KS-1A with Cement Plug

1) Purpose of Work

It will be at least a minimum of a year before KS-1A is needed for production service. Therefore PGV has decided to temporarily suspend the well by setting a 150 foot cement plug in the casing at 3000 feet. This will eliminate the need for further gas burns and will permit the wellhead to be serviced and the condition of the production casing to be checked in preparation for putting the well in service.

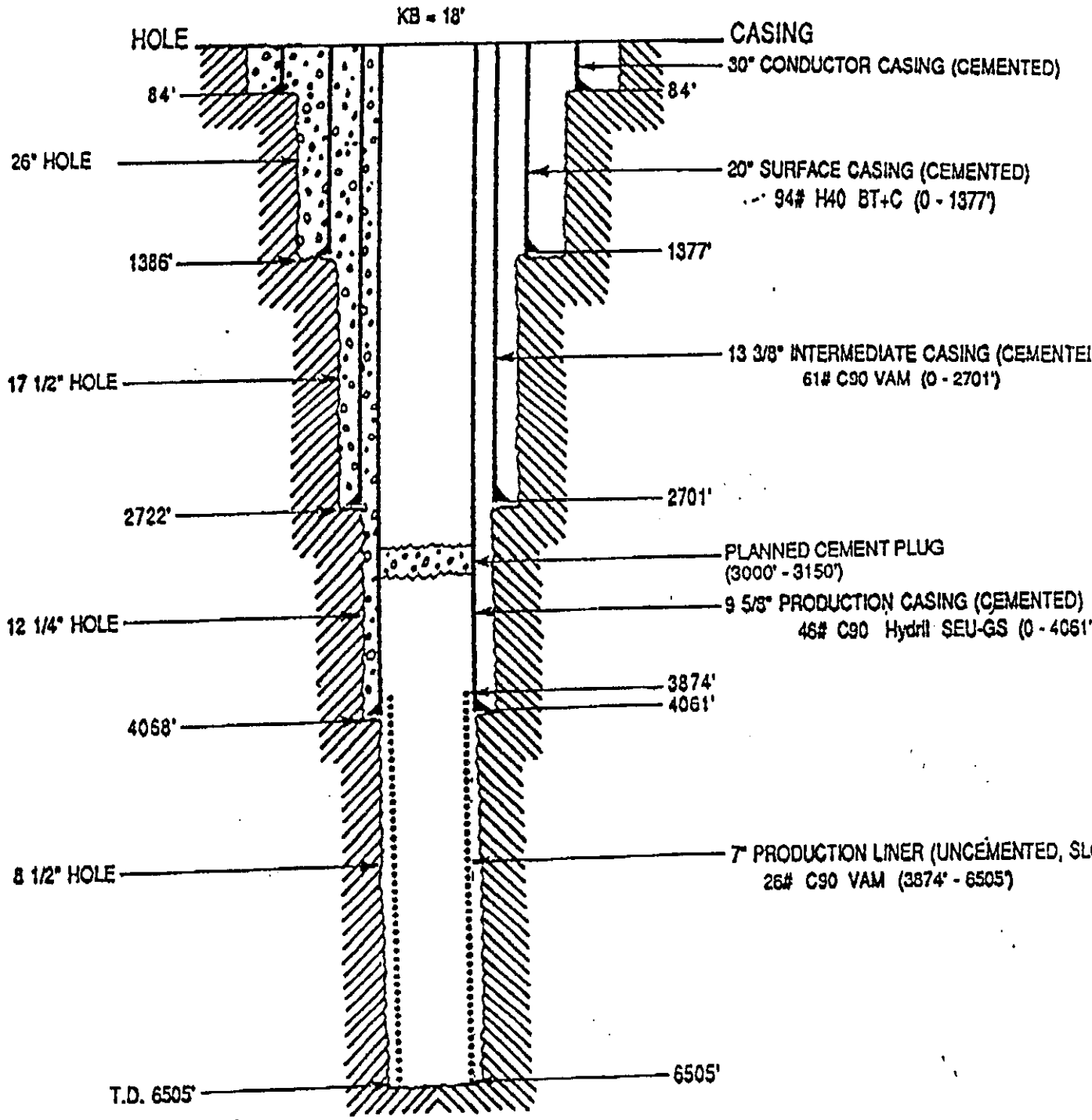
2) Plan of Work

The design of KS-1A showing the planned cement plug is shown in the attached figure. The setting depth of 3000 feet was chosen in order that the reservoir pressure beneath the plug will be balanced by the pressure exerted by the column of water in the wellbore above the plug. A rig will not be needed to carry out the work.
The operation is planned as follows :

1. Run sinker bar to 4500 feet.
2. Run a static pressure and temperature survey to 4500 feet.
3. Nipple-up pump to 3" side valve and kill well by slowly pumping cold water.
4. With the well killed run an 8" gauge ring to 3500 feet. Continue to pump water to maintain kill.
5. Run temperature survey to 4000 feet while maintaining kill to assess wellbore temperatures for cement slurry design.
6. Insert 9 5/8" bottom wiper plug through wellhead.
7. Pump 75 gallons (25 liner feet) water on top of plug.
8. Mix 60 cu ft (150 liner feet) geothermal cement and drop on top of water.
9. Insert top wiper plug and displace cement plug to 3000 feet with water (220 barrels).
10. Wait on cement 24 hours.
11. Run sinker bar to top of cement to check depth.
12. Shut-in wellhead and secure.

The operation is anticipated to take a total of 5 to 7 days.

KAPOHO STATE #1A WELL



Planned Cement Plug in KS-1A

RECEIVED

ORMAT®

89 MAR 29 A9:03

March 28, 1989
Reference No. 89071

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

DIV. OF WATER & LAND DEVELOPMENT

Re: Puna Geothermal Venture Project Geothermal Resource Permit Application Amendment - Additional Information

Dear Mr. Kanuha:

As indicated in our February 10, 1989 letter, Puna Geothermal Venture (PGV) hereby submits additional information to supplement the Puna Geothermal Venture Project Geothermal Resource Permit (GRP) Application Amendment on December 30, 1988. To facilitate the review of this additional information by your staff, and to enable a clearer understanding of the project by the general public, PGV has incorporated this additional information into the text of the original application amendment. Accordingly, the attached twenty-five (25) copies of the additional information are presented in the form of a complete GRP Application Amendment, and are intended to replace, in their entirety, those copies of the GRP application amendment submitted in December 1988, which should now be discarded. Also attached are five (5) full size copies of the oversize blueline drawings which are also reproduced in an 11" x 17" format in the application amendment.

This additional information provides a more thorough description of the proposed 25 MW (net) PGV Project and its environmental impacts. The additional information falls into three broad categories:

1) Additional descriptions of the environment in the project area, taken principally from previous studies at Puna;

2) Additional details regarding aspects of the proposed project based, in part, on further progress on the design for the project; and

3) Additional refinements in the analyses of the potential impacts of the proposed project, which have been developed both for this permit and the Authority to Construct Permit applications for the PGV Project power plant and wellfield, submitted concurrently to the State Department of Health.

PUNA GEOTHERMAL VENTURE

☐ 101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720 • Telephone (808) 961-2184 • Facsimile (808) 961-353
☐ 610 East Glendale Ave., Sparks, Nevada 89431-5811 • Telephone (702) 356-9111 • Facsimile (702) 356-912

A large body of environmental information about the proposed project area has previously been developed, including the data presented in the Geothermal Resource Permit application originally submitted by PGV on December 10, 1986 and data presented in the Puna Geothermal Venture Project Final Environmental Impact Statement, accepted by the Planning Department December 28, 1987. The GRP application amendment submitted in December, 1988 originally only referenced this information; now the applicable data has been incorporated into the attached document.

The additional details regarding aspects of the proposed project includes both more information on subjects included in the December, 1988 GRP application amendment and refinements in the project design made as a result of recent engineering analyses. Much of the new information is explanatory, e.g., the document clarifies that the GRP is for a 500-acre project area, but the proposed project will occupy only about 5 percent of the surface of this area (25 acres). More detail has been included on the proposed drill rig layout and operation, and new figures have been added to the description of the wellfield facilities (Section 3.2.1) to clarify the nature of proposed drilling activities. A new section (Wellfield Development Plan, Section 3.2.1.1) has been included to discuss the number of wells and the order in which PGV anticipates drilling these wells, although the document also indicates that this sequence may change as more reservoir data is obtained. To help visualize the proposed power plant, photographs of Ormat Energy Converter (OEC) units and air-coolers, installed in Nevada and California geothermal power plants, have been included in Appendix C. An artist's rendering of the project is also being prepared, which will be submitted shortly.

The refinements in project design since the December, 1988 GRP application amendment mostly affect the internal layout of the power plant site. These refinements are summarized as follows:

1. The 25 MW (net) project will now consist of ten (10) modules. Each module will contain a 1.8 MW back-pressure steam turbine that exhausts into a 1.2 MW OEC unit, each connected to a common nominal 3 MW generator. Each OEC unit will generate power from the low-pressue exhaust steam of a steam turbine, and the working fluid in the OEC unit binary cycle (isopentane) will be condensed by air coolers. In this design, the geothermal fluids never come in contact with the atmosphere during normal operation and the plant has a lower profile (maximum 24 feet for principal components).

2. The configuration of the air coolers has been changed, and several of the auxiliary facility locations have been moved, which alters the layout but not the size or boundary of the power plant site. The site plan and elevation drawings have been revised, and oversize drawings have been included to show the location of equipment and the process flows in detail.

3. The emergency steam release facilities (rock mufflers and holding pond) have been moved to approximately 250 feet southeast of the power plant site to improve dispersion of emergency steam releases, which will occur less than one (1) percent of the time.

4. The isopentane emergency release system has been revised to vent through ten individual stacks, which rise eight (8) feet above the air coolers, to enhance the dispersion of any isopentane emissions.

5. The temporary construction yard has been moved slightly, and a more detailed description of this and other temporary facilities is included.

6. The duration of infrequent project emissions have been more clearly defined: unabated emissions during drilling with aerated water or mud will be less than ten (10) minutes per event; unabated emissions during well venting will be less than four (4) hours per well; pipeline cleanout will last for thirty (30) minutes per pipeline; H_2S emissions from emergency steam releases will be reduced by 98 percent; and emergency isopentane releases will be less than a few minutes a year.

The most recent analyses of the air quality impact of the proposed project shows that more than 99 percent of the time, project emissions will be limited to fugitives, with negligible impacts. The greatest impacts from hydrogen sulfide will come from well venting, although these impacts will be limited to less than about one-half the proposed state hydrogen sulfide ambient air quality standard by scheduling venting to periods when winds are equal or greater than 4 m/s.

The noise impact analysis shows that the noise level from the power plant can be controlled to meet the county geothermal guidelines for residential areas during nighttime. Mitigation measures are proposed to reduce the impacts from well drilling.

Finally, we should point out that the proposed PGV Project has not direct relationship to the scientific observation hole (SOH) program now being proposed by the University of Hawaii, although one SOH location is within the PGV Project area and will provide useful information on the reservoir. The PGV Project can and will proceed independently of the SOH program. In addition, the proposed PGV Project has no direct relationship to the HGP-A Project, located immediately adjacent to the proposed PGV Project. The design and operation of the PGV Project is completely different than that of the HGP-A Project, and these fundamental differences, principally the injection back into the geothermal reservoir of all geothermal fluids and gases without use of brine ponds during normal operations, will result in a project which will have none of the major impacts associated with the HGP-A project, such as the continuous emission of H_2S or the silica deposits which occur with the brine ponds.

PGV would like to thank you and your staff for your assistance to date with this application amendment, and offer our complete cooperation in your timely review and early approval of this PGV Project Geothermal Resource Application Permit.

Sincerely,

Maurice A. Richard
Puna Geothermal Venture
Hawaii Regional Development
Manager

Attachments

cc:
D. Carey w/attachments

MAR/ci

additional 12.5 MW is expected to be completed by mid 1990.

RECOMMENDATION:

That the Board approve the amendment to Plan of Operations submitted by Puna Geothermal Venture for a 25 MW geothermal project on State Mining Lease No. R-2, subject to the following conditions:

(1) That Puna Geothermal Venture comply with all applicable statutes, ordinances, rules and regulations of the Federal, State, and County governments.

(2) Other terms and conditions as may be prescribed by the Chairperson.

Respectfully submitted,

MANABU TAGOMORI
Manager-Chief Engineer

APPROVED FOR SUBMITTAL

for WILLIAM W. PATY, Chairperson

Approved by the Board of
Land & Natural Resources
at the meeting held on

MAR

ITEM D-1

RECEIVED
89 FEB 27 P 3:20

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Environmental Affairs
Honolulu, Hawaii

DIV. OF WATER & LAND DEVELOPMENT FEB 27 1989

FILE NO.: 89-383
DOC. NO.: 5210E

MEMORANDUM

TO: Mr. Manabu Tagomori, Deputy Director
Commission on Water Resource Management

FROM: Roger C. Evans, Administrator
Office of Conservation and Environmental Affairs

SUBJECT: Review of Puna Geothermal Venture's (PGV) Amendment to Plan of Operation for the 25 MW Geothermal Project

According to Mr. Maurice Richard's correspondence, principal among the proposed changes is the use of back-pressure steam turbines, in combination with air-cooled binary cycle turbines, in place of the steam turbines and cooling towers proposed by Thermal Power Company (TPC).

A benefit from the amendment is that it will essentially eliminate hydrogen sulfide emissions, while most other environmental impacts from this project will be the same as those described in the Puna Geothermal Venture (PGV) Project Final EIS. The Amor Corporation's proposed PGV Project will be located on the same site as the PGV project proposed by TPC, and will use the same well pad locations and the same geothermal resource.

As such, OCEA has no concerns about the amendment that would impact our programs, and regard the elimination of the hydrogen sulfide emissions as a benefit to the 25 MW Geothermal Project.

Please feel free to call me or Roy Schaefer of our Office, at 7837, if you have any questions.

ROGER C. EVANS

SH-461

FACSIMILE MESSAGE from PUNA GEOTHERMAL VENTURE

101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720
Phone: (808) 961-2184 Telefax: (808) 961-3531

MSG NO. 90131 DATE: 02/27/89. PAGE # 1 of 5

To: D. Sum / D. Mebane Fm: N. Richard.

Attn: _____ CC: _____

RE: GLP changes.

Consistant with our telephone conversation this morning; please review for a conference call later in the day. Regards.

CHANGES TO THE PUNA GEOTHERMAL VENTURE PROJECT GEOTHERMAL RESOURCE PERMIT APPLICATION (VERSION OF DECEMBER 1988)

Changes Made in Response To Questions Asked by the County of Hawaii:

1) Believing that reviewers of the Geothermal Resource Permit Application (GRP) would be confused by the many references to information presented in the Environmental Impact Statement (EIS) prepared for the previous Puna Geothermal Venture (PGV) Project, the County asked that the GRP be revised to incorporate into the GRP all the pertinent information from the EIS which is required by Rule 12. In response, PGV is revising the GRP to include some additional information from the EIS regarding geology, air quality, noise, and visual impacts, among others, and reviewing all references to the EIS in the GRP to make certain that the EIS is only presented as a source of information, not a document which must be reviewed to understand the PGV GRP.

2) At the request of the County, PGV is revising the GRP to include additional specific information regarding the drill rig layout and operation, and the potential impacts and mitigation measures for noise and visual aspects of the geothermal well drilling operation.

3) To assist the County, PGV has rewritten the section which describes the 816 acres geothermal lease, the 500 acres for which this GRP is applied, and the 25 acres of actual surface disturbance.

4) The County has asked for additional discussion of the activities described on the project development schedule. Specifically, with regard to the power plant development, Ormat has indicated that the power plant will consist of 10 modular units, each consisting of an approximately 1.8 MW back pressure steam turbine and a 1.2 MW OEC modular binary turbine unit, connected to a common 3 MW generator unit. PGV has also indicated that with regards to the three start-up situations identified in Figure 3-14 of the GRP: 1) the initial stage will consist of operating only some of the OEC units without the steam turbines; 2) the middle stage will consist of operating 5 steam turbine/OEC unit modules and 5 OEC-only modules; and 3) completion will be reached when all 10 steam turbine/OEC modules are operational. Depending on the final power sales agreement with HELCO, there is also a possibility that the first two stages will be combined into one stage of approximately 12.5 MW, consisting of the 10 OEC units only.

5) In response to the County's request for additional information regarding the wellfield development plan,

including the order in which the wells would be drilled and their bottomhole locations, PGV has created a new section of the GRP for describing the current wellfield development plan and its rationale, and providing a proposed initial sequence for well drilling. Although not proposing specific bottomhole locations for the geothermal wells, PGV is revising the GRP to include additional information regarding why the wells will be directionally drilled and how the decisions will be made regarding the order in which the wells will be drilled and the bottomhole targets selected.

6) The County has asked about how the proposed PGV Project relates to other activities proposed for this same project site area, including the scientific observation holes. PGV has indicated that there is no direct relationship between those proposed scientific observation holes and the proposed PGV Project, although some of the information produced by the scientific observation hole program may be useful to the PGV Project, and PGV may desire similar information on its leases in the future.

7) The County has asked PGV to provide more and better information to help them visualize what the project will look like. To the extent that this project will be similar to other geothermal projects in Nevada and California, PGV has attached to the revised GRP several photographs and with explanatory material regarding geothermal power plants which utilize OEC units and/or air cooling. In addition, the building schematics have been altered and improved, and additional information regarding the aesthetic impact of the project (elevations for temporary structures and the geothermal drilling rig) has been included. Additional information is also provided regarding the potential visual impacts and mitigation measures of the project and an artist's rendering is being prepared which will be submitted at a later date.

8) In response to a concern that the proposed brine holding pond will end up looking like the geothermal brine ponds utilized by the HGP-A Project, PGV has revised the GRP to indicate that the PGV holding pond would be utilized only under certain emergency situations (less than one percent of the time), rather than the continuous use that the HGP-A makes of its pond; that the holding pond may receive condensate in addition to the geothermal brine; and the brine would be flashed in the rock muffler prior to dischcarge to the pond.

9) To clarify the question of how much isopentane may be released via the emergency vent, the GRP has been revised to indicate that the maximum credible release of isopentane under any emergency situation would be less than 2,500 lbs, and that emission of this much isopentane would probably only occur in a series of small emissions over a short period of time through the relief valve.

10) Finally, in response to a County question regarding comparisons with the PGV Project and the HGP-A Project, we have included some additional information comparing the two projects.

Changes Made in the Project Design as a Result of Ongoing Project Design Efforts:

1) The size of the air cooler units has been altered to make them wider (from 40 feet to 66 feet), which has resulted in a substantial decrease in the length of the two batteries of air coolers (from 455 feet to 281 feet).

2) As a result of optimization studies, and to increase reliability and flexibility in operation and maintenance, the power generation equipment has been designed to include ten back-pressure steam turbine/OEC modules connected to a common 3 MW generator, to be laid out in two 5-module banks. As a result, the steam turbine building has been removed from the plot plan, which results in a smaller, lower-profile building for the control room and workshops.

3) As a result of additional investigations regarding the reliability of the hydrogen sulfide abatement equipment, the absorber has been deleted from the project equipment as being an unnecessary back-up to the in-line mixer.

4) The temporary construction yard has been expanded to both sides of the principle access road to provide security during construction, and additional information regarding the structures and facilities to occupy this has been provided.

5) The rock mufflers (part of the emergency steam release system) have been moved outside of the power plant battery limit approximately 350 feet south of the southeast corner of the power plant site, to ensure that during almost all wind conditions the rock mufflers will be downwind of the

power plant site and to improve dispersion. In addition, the holding pond has been relocated from the west side of the power plant site to outside of the southeast corner of the power plant site, to be adjacent to the rock mufflers and downwind of the power plant.

6) The isopentane emergency release venting system has been revised to vent through ten low-profile, individual stacks, one each for each OEC unit, venting above the air coolers for better dispersion.

7) Within the battery limits of the power plant site, substantial rearrangement of power plant structures and facilities have occurred.

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

LIBERT K. LANDGRAF
MANABU TAGOMORI
RUSSELL N. FUKUMOTO

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

FEB 22 1989

Mr. Maurice A. Richard
Hawaii Regional Development Manager
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

The Department of Land and Natural Resources acknowledges the acceptance of your Amendment to the Plan of Operations for State Geothermal Resource Mining Lease No. R-2.

The amendment to the previously submitted Plan of Operations is under review by our Department and will be processed in a timely manner. Notification of the date and time at which the matter will be brought before the Board of Land and Natural Resources will be forthcoming.

Should you have any questions, please contact Manabu Tagomori at 548-7533.

Very truly yours,

WILLIAM W. PATY

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720
(808) 961-8288

COUNTY OF HAWAII

BERNARD K. AKANA
Mayor

DUANE KANUHA
Acting Director

WILLIAM L. MOORE
Acting Deputy Director

January 25, 1989

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni St., Suite 1014B
Hilo, HI 96720

Dear Mr. Richard:

Geothermal Resource Permit Application
Puna Geothermal Venture's 25MW Power Plant

We have received your letter of December 30, 1988, transmitting your "Amendment To The Geothermal Resources Permit Application for the Puna Geothermal Venture Project." My staff is continuing to review this submittal and we will respond to you under separate cover whether this submital does/does not constitute a properly filed application. The format used to present your information is particularly cumbersome in its numerous references to the previously submitted EIS. Please note that this EIS has not been widely circulated and will not be readily available for reference by other reviewers.

Meanwhile please bear with us. We expect to complete our detailed comments shortly.

Sincerely,

DUANE KANUHA
Acting Planning Director

RKN:aeb

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LIBERT K. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

January 25, 1989

MEMORANDUM

TO: Manabu Tagomori, Deputy Director, Commission on Water Resource Management

FROM: Ralston H. Nagata, State Parks Administrator

SUBJECT: Puna Geothermal Venture's Amendment to Plan of Operation for 25 MW Geothermal Project
Kapoho, Puna, Hawaii
TMK: 1-4-1: 1, 2, 19

HISTORIC SITES SECTION CONCERNS:

The documentation indicates the same project area will be used as previously planned. Our April 28, 1987 conclusion of "no effect" to significant historic sites still applies. The cultural resources section adequately covers historic preservation concerns with physical historic properties and it also addresses the recent concerns regarding Pele and worshipping rights, which is a concern separate from the historic preservation laws under our jurisdiction (pp. 115-117).

RALSTON H. NAGATA

January 19, 1989

MEMORANDUM

TO: State Parks, Forestry & Wildlife, Aquatic Resources, Aquaculture Development Program, and Office of Conservation and Environmental Affairs

FROM: Manabu Tagomori, Deputy Director
Commission on Water Resource Management

SUBJECT: Review of Puna Geothermal Venture's (PGV) Amendment to Plan of Operation for the 25 MW Geothermal Project

Puna Geothermal Venture (PGV) has submitted an amendment to the previously submitted Plan of Operation (POP) for a 25 MW geothermal power plant and associated well field. The attached document entitled "Geothermal Resource Permit Application Amendment for the Puna Geothermal Venture Project" supercedes the earlier POP which was submitted to DLNR and routed to your division for review and comment.

The amendment contains details of PGV's plans for incremental wellfield development and construction of a power plant facility. The PGV project is proposed for the area covered under DLNR Geothermal Resource Mining Lease R-2, located within the Kapoho Section of the Kilauea Lower East Rift Geothermal Resource Subzone.

We would appreciate your review of this document as it pertains to your area of concern and the return of the document with your comments to our division by Monday, January 30, 1989. To facilitate your review of the POP, we would like to invite your designated representative to attend a presentation of the project by the developer (ORMAT Energy Systems, Inc.) on Thursday, January 26, 1989, at 10:00 am in the DOWALD conference room.

Your continued assistance and cooperation is greatly appreciated. Should you have any questions, please contact Dan Lum at Ext. 7643.

Manabu Tagomori
Deputy Director

Attach.

FACSIMILE MESSAGE from PUNA GEOTHERMAL VENTURE

276

WL

101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720
Phone: (808) 961-2184 Telefax: (808) 961-3531

MSG NO. 9021 **DATE:** January 18, 1989 **PAGE #1 of 7**

To: Department of Land and Natural Resources **Fm:** Maurice Richard

Attn: William W. Paty **CC:** M. Tagomori, D. Lum / DLNR

RE: 89011/Geothermal Mining Lease R-2 - Amendment to Plan of Operation
89012/Geothermal Mining Lease R-1, R-2, R-4 - Designation of Operator and Designation of Agent

Attachments for letter addressed to William W. Paty, reference number 89011 sent under separate cover.

Please provide Mr. Tagomori and Mr. Lum with copies of these letters with the necessary attachments, as necessary.

Thank you.

RECEIVED
88 JAN 19 A7:43
BUREAU OF CONVEYANCES
STATE OF HAWAII

RECEIVED
88 JAN 19 A8:05
WATER & LAND DEVELOPMENT

WL

276

ORMAT®

January 18, 1989
Reference No. 89012

RECEIVED
89 JAN 19 A7:49
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

Mr. William W. Paty, Chairperson
Board of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Re: Geothermal Mining Lease R-1, R-2, and R-4 - De[illegible] ator and Designation of Agent

Dear Chairman Paty:

Puna Geothermal Venture (PGV), as sublessee of Geother[illegible] Leases R-1, R-2, and R-4, and pursuant to Department of Land [illegible] Natural Resources (DLNR) Administrative Rules, Title 13, Chap[illegible], Section 45(f), hereby designates AMOR VIII Corporation as o[illegible] and all of the above-named leases. AMOR VIII Corporatio[illegible] of the two partners forming PGV, has previously filed, pur[illegible] our letter of October 24, 1988 to your office, a blanket well indemnity bond as required under DLNR administrative rules Section 13-183-68.

Pursuant to Section 13-183-64 of the DLNR administrative regulations, PGV and AMOR VIII Corporation also hereby designate Mr. Maurice A. Richard as their agent upon who may be served all orders, notices, and processes of the DLNR at the following address:

Mr. Maurice A. Richard
Hawaii Regional Development Manager
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720
Telephone (808) 961-2184
Facsimile (808) 961-3531

Please do not hesitate to contact me if you have questions concerning the above information or require any additional information to complete the requested actions.

Sincerely,

PUNA GEOTHERMAL VENTURE

By: AMOR VIII CORPORATION
General Partner

By: Maurice A. Richard
Authorized Representative

cc:
M. Tagomori - DLNR
D. Lum - DLNR

MAR/ci

ORMAT®

January 18, 1989
Reference No. 89011

Mr. William W. Paty, Chairperson
Board of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Re: Geothermal Mining Lease R-2 - Amendment to Plan of Operation for the 25 MW Puna Geothermal Venture Project

Dear Chairman Paty:

AMOR VIII Corporation (AMOR VIII), as designated operator for Geothermal Mining Lease R-2, hereby requests that the Board of Land and Natural Resources (BLNR), pursuant to Department of Land and Natural Resources (DLNR) Administrative Rules, Title 13, Chapter 183, Sections 55 and 56, accept this letter and its attachment as an amendment to the previously submitted Plan of Operation (Plan) for the 25 MW Puna Geothermal Venture Project (PGV Project) power plant and associated geothermal wellfield. The PGV project is proposed for Geothermal Mining Lease R-2, which is located in the Kapoho section of the Kilauea Lower East Rift Geothermal Resources Subzone in the Puna District of the Island of Hawaii. The project will sell the generated electricity to the Hawaii Electric Light Company (HELCO) for use on the Island of Hawaii.

On December 8, 1986, Thermal Power Company (TPC), then the designated operator of the Puna Geothermal Venture partnership, submitted a Plan of Operation to the BLNR for the PGV Project. The BLNR deferred processing of the PGV Project Plan while TPC, at TPC's request, proceeded with the preparation of an Environmental Impact Statement (EIS) for the PGV Project. Subsequent to acceptance of the Final EIS for the PGV Project by the Hawaii County Planning Department, no further processing of the submitted Plan has taken place because the entire interest in the PGV partnership was purchased during the first half of 1988 by AMOR VI Corporation and AMOR VIII Corporation (AMOR Corporations), two wholly-owned subsidiaries of Ormat Energy Systems, Inc. of Sparks, Nevada (please refer to letters dated August 2, 1988, October 6, 1988 and October 24, 1988 to your office for additional information regarding Puna Geothermal Venture).

Since their purchase of all the interests to PGV and the PGV Project, the AMOR Corporations have reviewed the TPC design of the PGV Project to determine if it remains entirely appropriate. As a result of this design review, the AMOR Corporations have decided to alter several aspects of the PGV Project proposed by TPC to optimize projection operations and further reduce the potential for environmental impacts. Principal among these proposed changes is the use of back-pressure steam turbines, in combination with air-cooled binary cycle turbines, in place of the steam turbines and cooling towers proposed by TPC. This proposed power plant

PUNA GEOTHERMAL VENTURE

☐ 101 Aupuni Street Suite 1014-B, Hilo, Hawaii 96720 • Phone (808) 961-2184 • Facsimile (808) 961-353
☐ [illegible]

configuration applies a closed cycle for the geothermal fluid, thus eliminating the need for cooling water. Besides essentially eliminating hydrogen sulfide emissions, most other environmental impacts from this project will be the same as those described in the PGV Project Final EIS because the AMOR corporations' proposed PGV Project will be located on the same site as the PGV Project proposed by TPC, and will use the same well pad locations and the same geothermal resource.

This amendment to the PGV Project Plan has been prepared to replace, in its entirety, the Plan of Operation for the PGV Project submitted to the BLNR in December, 1986. The amended Plan consists of this letter and a copy of the Geothermal Resource Permit (GRP) application amendment for this revised PGV Project, which was submitted to the Hawaii County Planning Department on December 30, 1988, as the GRP application amendment contains all the information required in Title 13, Chapter 183, "Rules on Leasing and Drilling of Geothermal Resources," Section 55, "Plan of Operation Required." The following concordance compares the information requirement of Section 13-183-55 with the sections of the Puna Geothermal Venture GRP application amendment:

> "(1) The proposed location and elevation above sea level of derrick, proposed depth, bottom hole location, casing program, proposed well completion program and the size and shape of drilling site, excavation and grading planned, and location of existing and proposed access roads;"

The locations and elevations of the six proposed wellpads on which the 150-foot derrick will be placed are discussed in Section 3.2.1.1. Wellpads and Access Roads. This section also describes the size and shape of the drilling sites and the location of the existing and proposed access roads. Project elevations are discussed in Section 3.4. Elevation of Structures.

The proposed depth, bottom hole locations, casing program, and the proposed well completion program are discussed in Section 3.2.1.2. Well Drilling. Appendix B contains additional information on the well casing and well completion program. Information on injection casing is contained in Section 3.2.1.6. Geothermal Fluids Injection System.

Excavation and grading plans are presented in Section 3.6. Surface Disturbance.

> "(2) Existing and planned access, access controls and lateral roads;"

The existing and planned access roads are presented in Section 3.2.1.1. Well Pads and Access Roads and Section 3.10.8.1. Traffic. Access control is discussed in Section 3.2.3.6. Fencing and in Section 3.10.6. Protection of Public Health and Safety.

"(3) Location and source of water supply and road building material;"

No water will be needed for power plant cooling. The location and source of water supply for service water is discussed in Section 3.3. Plot and Site Plans. No significant amount of road building materials will be needed for the project. Most access roads will be improved from existing agricultural roads, and only Wellpad F will require a new road.

"(4) Location of camp sites, air-strips, and other supporting facilities;"

The location of the temporary construction yard is shown on Figure 2-1. No air strip or other supporting facilities are proposed for the project.

"(5) Other areas of potential surface disturbance;"

Surface disturbance is discussed in Section 3.6. Surface Disturbance.

"(6) The topographical features of the land and the drainage patterns;"

Figure 3-2 is a topographical map of the project area. Drainage is described in Section 3.2.3.4. Site Drainage Facilities and Section 3.8. Geologic Report.

"(7) Methods of disposing of well effluent and other waste;"

Section 3.7. Disposal of Well Effluent and Other Waste discusses disposal of geothermal brines, condensate and noncondensable gases as well as other wastes. Further detail is provided in Section 3.2.1.6. Geothermal Fluids Injection System. Well testing effluents are discussed in Section 3.2.1.3. Well Testing.

"(8) A narrative statement describing the proposed measures to be taken for protection of the environment, including, but not limited to the prevention or control of:

(A) Fires,
(B) Soil erosion,
(C) Pollution of the surface and ground water,
(D) Damage to fish and wildlife or other natural resources,
(E) Air and noise pollution, and
(F) Hazards to public health and safety during lease activities.

Section 3.10. Environmental Protection is a written description of the measures to be taken to protect the environment. It includes the following subsections: 3.10.1. Fire Protection; 3.10.2. Erosion Control; 3.10.3. Protection of Sruface Waters and Groundwater; 3.10.4. Protection of Fish and Wildlife and other Natural Resources; 3.10.5. Control of Air and Noise Emissions; and 3.10.6. Protection of Public Health and Safety.

"(9) A geologist's preliminiary survey report on the surface and sub-surface geology, nature and occurrence of the known or potential geothermal resources, surface water resources, and ground water resources;"

Section 3.8. Geologic Report describes the surface and subsurface geology, the nature and occurrence of the known or potential geothermal resources, surface water resources and groundwater resources.

"(10) All pertinent information or data which the chairperson may require to support the plan of operations for the utilization of geothermal resources and the protection of the environment;"

The PGV project GRP contains additional details on the project, particularly in Section 3.2. Project Scope and Description. If the chairperson requires further information, it will be provided upon request.

"(11) Provision for monitoring deemed necessary by the chairperson to insure compliance with these rules for the operations under the plan."

Section 3.12. Monitoring Plans lists the monitoring activities proposed by PGV to show compliance with regulations. This discussion includes the following subsections: 3.12.1. Meteorological and Air Quality Monitoring; 3.12.2 Noise Monitoring; 3.12.3. Biological Monitoring; and 3.12.4. Compliance with Regulations, including the DLNR regulations in Chapter 183.

The plot plan and other drawings have been reduced for ease of copying. Larger size drawings are available if the DLNR staff requires them for their review. In addition, fourteen additional copies of the attachment to this letter, the PGV Geothermal Resource Permit application amendment, have been delivered under separate cover to the staff of the DLNR to facilitate the BLNR's review of the Plan.

Please do not hesitate to contact me if you have questions concerning the PGV Project or if we can be of any assistance in your timely review and approval of the Plan of Operation.

Sincerely yours,

AMOR VIII Corporation

by Maurice A. Richard
its Designated Agent

cc:
M. Tagomori - DLNR
D. Lum - DLNR

LARRY S. TANIMOTO
Mayor
Duane Kanuha
Director
William L. Moore
Deputy Director

Planning Department

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

November 1, 1990

Mr. William W. Paty, Chairperson
Board of Land & Natural Resources
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Paty:

Thanks for your letter of clarification dated October 19, 1990.

We stand corrected in our acknowledgment of September 27, 1990; the proper statement should have been:

"... net revenues derived from the resources generated by by HGP-A well, or a similar amount from other State funding sources ..." (emphasis added)

Our apologies for this typo. We are clearly aware that the State's contribution was never intended to be the source of HGP-A revenues and other State funding sources.

Sincerely,

DUANE KANUHA
Planning Director

DK:aeb

cc: Planning Commission

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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MANABU TAGOMORI
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FORESTRY AND WILDLIFE
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STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

OCT 25 1990

REF:WRM-MH

Mr. Norman J. Clark
Project Manager
Puna Geothermal Venture Construction
P.O. Box 1337
Hilo, Hawaii 96721-1337

Dear Mr. Clark:

The Department of Land and Natural Resources has received your construction plans for the Puna Geothermal Venture 25 MW Power Plant Project. We have reviewed the drawings and have no objections to your proposed plans.

We would appreciate your keeping us informed of any proposed revisions to your construction plans. Also, please be advised that if you contemplate any amendments to your Plan of Operations (approved by the Board of Land and Natural Resources on 3/10/89), the Chairperson's approval must be obtained in writing prior to the execution of any such changes.

Should you have any questions, please contact Manabu Tagomori, Deputy Director, at 548-7533.

Very truly yours,

WILLIAM W. PATY

CRM

1430

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RECEIVED
90 SEP 17 A 8:08
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
90 SEP 18 A 8:38
DIV. OF WATER & LAND DEVELOPMENT

September 13, 1990

State of Hawaii
Department of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96709

Attn: Mr. William Paty, Chairman

Re: Geothermal Resources Mining Lease No. R-2
Puna Geothermal Venture

Dear Sir,

Attached herein and as detailed by the attachments, you will find the current set of plans as submitted to Hawaii County in regard to our project plan approval. These drawings are issued in an information only format and if revisions occur, we will forward these to your office.

If you have any questions or problems, please do not hesitate to contact me.

Respectfully,

Norman J. Clark
Project Manager

NJC/sdb
Attachments
cc: MAR

PUNA GEOTHERMAL VENTURE CONSTRUCTION
99 Aupuni Street #114 • Hilo, Hawaii 96720 • Telephone (808) 961-2786 • Facsimile (808) 935-5562

PUNA GEOTHERMAL VENTURE - DRAWINGS LIST 09/11/90

DRAWING NO.	TITLE	LAST REV	LAST REV DATE
89041-C-1	OVERALL SITE PLAN, NOTES, RD INTERSECTION	2	NOV/01/89
89041-C-3	SITE PLAN/UTILITY PLAN	3	JUL/31/90
89041-C-4	SITE PLAN	2	MAR/14/90
89041-C-5	GRADING PLAN - POWER PLANT	4	SEP/07/90
89041-C-7	CHAIN LK FENCE & GATE, DRYWELL CVR & CESSPOOL DET	--	---
89042-G-1	GENERAL LOC & ELEV - MAJOR EQUIPT & STRUCTURES	1	SEP/06/90
8940-00-E-2	OVERALL SITE - CABLING & GROUNDING PLAN	1	SEP/08/90
8940-00-E-13	PLANT SITE - LTG, RECP & SIGNALING PLAN	0	MAY/14/90
8940-00-E-30	TYP. WELLPAD - PLAN	1	---
8940-00-E-31	INJECTION WELLPAD - PLAN	--	---
8940-00-E-32	WELLPAD - O.L. DIAG, DETS, PNL SCHS & CALCS	0	MAY/14/90
8940-00-E-33	LIGHTING DETAILS	0	MAY/14/90
7.799.50.015.0	PIPING GATHERING SYSTEM	0	---
033.2900-L1	SITE ANALYSIS	--	MAR/13/90
033.2900-L2	LINE OF SIGHT ANALYSIS	--	MAR/13/90
033.2900-L3	SITE REVEGETATION/RECLAIM PLAN	--	MAR/13/90
033.2900-L4	POWER PLANT & TYPICAL WELL PLANTING PLAN	--	MAR/13/90
033.2900-L5	LINE OF SIGHT ANALYSIS	--	APR/16/90
033.2900-L6	LINE OF SIGHT ANALYSIS	--	APR/27/90
FP-1	FIRE PROTECTION SITE PLAN	--	MAR/08/90
FP-2	FIRE PUMP LAYOUT	--	MAR/08/90
FP-3	SPRINKLER PIPING PLANS	--	MAR/08/90

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
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WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

OCT 19 1990

REF:WRM-MH

Mr. Duane Kanuha, Director
Planning Department
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720

Dear Mr. Kanuha:

Thank you for your letter of September 27, 1990 acknowledging the receipt of our check for $250,000, submitted in compliance with Condition No. 51 of the Geothermal Resource Permit issued to Puna Geothermal Venture.

In your letter, reference was made to Condition No. 51, which we quote as follows:

"The State's initial annual contribution to the Geothermal Asset Fund shall be the net revenues derived from the resources generated by the HGP-A Well, and a similar amount from other State funding sources less any allocation entitled to the Office of Hawaiian Affairs and operations and maintenance costs." (emphasis added)

However, if you will review page 20, item 51 of your GRP-87-1, you will find that the use of the word and is incorrect and section referenced in your letter should more properly have read as follows:

"....net revenues derived from the resources generated by the HGP-A well, or a similar amount from other State funding sources...." (emphasis added)

While the use of the word "and" may have been a typographical error, it should be made very clear that the State's contribution shall be based on either net revenues from HGP-A or other appropriate State funding sources less any allocations, and not the sum total of both, as inferred in your letter.

Should you have any questions concerning the above, please do not hesitate to call me.

Very truly yours,

WILLIAM W. PATY

WLM

1781

LARRY S. TANIMOTO
Mayor
Duane Kanuha
Director
William L. Moore
Deputy Director

Planning Department

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

September 27, 1990

Mr. William W. Paty, Director
Dept. of Land & Natural Resources
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Paty:

This is to acknowledge receipt of the check for $250,000 towards a Geothermal Asset Fund for the purpose of geothermal impact mitigation efforts within the Puna District.

This payment fulfills the State's obligation for its initial annual contribution towards the Geothermal Asset Fund in accordance with Condition No. 51 of Geothermal Resource Permit No. 2.

For your information, Condition 51 states in part that:

> The State's initial annual contribution to the Geothermal Asset Fund shall be the net revenues derived from the resources generated by the HGP-A Well, and a similar amount from other State funding sources less any allocation entitled to the Office of Hawaiian Affairs and operations and maintenance costs. (emphasis added)

Please feel free to call me if you have any questions on the above.

Sincerely,

DUANE KANUHA
Planning Director

WLM:aeb

cc: Planning Commission

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SEP 21 1990

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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WATER AND LAND DEVELOPMENT

REF:WRM-MH

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Kanuha:

Enclosed is a check for $250,000 to fulfill the State's obligation relative to Condition 51 of the Geothermal Resource Permit (GRP 87-1) issued to Puna Geothermal Venture.

My understanding is that with the $250,000 authorized by the Legislative being deposited in Hawaii County's asset fund account condition 51 has been met.

Sincerely,

WILLIAM W. PATY

Encl.

Wam

1464

RECEIVED
90 SEP 18 P 2:59
BOARD OF LAND & NATURAL RESOURCES
STATE OF HAWAII

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90 SEP 25 P 3:36
DIV. OF WATER & LAND DEVELOPMENT

September 14, 1990

William Paty
Chairman
Board of Land & Natural Resources
Kalanimoku Bldg. #130
1151 Punchbowl Street
Honolulu, HI 96813

Subject: Puna Geothermal Venture
Extension for Well No. 2883-07

Dear Mr. Paty,

Puna Geothermal Venture respectfully requests a six month extension to construct Observation Well No. 2883-07. The permit for the well was approved by the Commission on Water Resource Management on April 2, 1990 and the six month commencement period will close on October 2, 1990. We have been unable to proceed with construction because of delays with the project's permitting process, most notably the signing of the Emergency Response Plan by the Civil Defense Director. The grubbing permit required for drill pad preparation was issued on September 7, 1990. It does not appear that we will be able to complete site preparation and mobilize the drill rig before the October 2nd deadline. We are therefore requesting a six month extension of the above referenced permit.

Should you have any questions or require any additional information, please contact me at our Hilo office at 961-2786.

Thank you for your consideration in this matter.

Sincerely,

William F. Teplow
Field Manager

WT/sdb

PUNA GEOTHERMAL VENTURE CONSTRUCTION
P.O. Box 1337 Hilo, Hawaii 96721-1337

ORMAT®

September 14, 1990

Department of Land and Natural Resources
Division of Land Management
P.O. Box 621
Honolulu HI 96709

Dear Sir/Madam:

This notification is to inform you of the approval of the Emergency Response Plan by the Hawaii County Civil Defense Agency. A copy of that plan is available for your review at each of the following locations:

Department of Business, Economic Development,
and Tourism
Energy Extension Office
99 Aupuni Street
Room #214
Hilo, HI 96720

Hawaii County Planning Department
25 Aupuni Street
Hilo, HI 96720

Hawaii County Civil Defense Agency
820 Ululani Street
Hilo, HI 96720

Also, be advised that drilling activities for well KS-4 shall commence on September 28, 1990.

Respectfully,

Norman J. Clark
Project Manager

NJC/sdb

PUNA GEOTHERMAL VENTURE CONSTRUCTION
P.O. Box 1337 Hilo, Hawaii 96721-1337
~~99 Aupuni Street #114~~ • ~~Hilo, Hawaii 96720~~ • Telephone (808) 961-2786 • Facsimile (808) 935-5562