SCOPING MEETING SUMMARY

Mary S. Quinby-Hunt

8 June 1992

PAHOA, HAWAII, 7 March 1992, 2PM SESSION

OVERVIEW

The meeting began with presentations by the facilitator, Mr. Spiegel, and the representative from DOE, Dr. Lewis. The facilitator introduced those on the podium. He then described the general structure of the meeting and its purpose: to hear the issues and concerns of those present regarding the proposed Hawaiian Geothermal Project. He described his role as assuring the impartiality and fairness of the meeting. Dr. Lewis of DOE further defined the scope of the project, introduced those of the EIS team present and briefly described the EIS process.

Political Issues. The majority of those present (~75%) criticized the government's role in permitting and monitoring geothermal development and in providing adequate information regarding the health and safety of the current geothermal development. They expressed frustration and a feeling of lack of consideration for their concerns by government.

Health and Safety. The next most frequently expressed concerns were those regarding the health and safety impacts of geothermal development, from drilling and operation through decommissioning, under normal and failure modes, notably in a residential area and on an active volcano. Health and safety concerns achieve even greater weight of mention when coupled with more general air and water quality concerns. Commenters wanted the EIS to describe what substances were being released, in what quantities, where, and what their short-term and long-term health effects were when consumed in air, water or food. They also stated that the EIS should investigate the impacts of electromagnetic fields (emf), noise, stress, and fear. Adequate mitigation and emergency response plans are needed. The commenters noted that the geothermal experience to date in Puna has been a history of controlled and uncontrolled venting, blowouts and "kicks." They suggested, therefore, that the EIS should consider the failure mode a probable one, and that the EIS extrapolate from the 2.5 MW and 25 MW examples to the 500 MW level when assessing potential impacts.

A large number of other issues and concerns were presented. The presenters want the goals of the HGP and the "Proposed Action" better defined, including the actual land use and needs of the geothermal development, its infrastructure, and the proposed cable routes. They also want a detailed cost-benefit analysis that addresses who will pay the costs and who will benefit from the development. They questioned the availability and renewability of the resource. A large number (more than 25%) raised issues concerning the reliability and

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stability of the resource and the geothermal operations in a region that is replete with vertical dikes and fractures, geologically young, and volcanically and seismically active. Conversely, the commenters expressed concern that undertaking geothermal development in a seismically and volcanically active zone may exacerbate those activities and upset the hydrological balance of the region.

Alternatives. More than 30% of the presenters requested that the EIS explore alternatives to the Proposed Action. They mentioned the inclusion of solar technologies, wind and demand-side management (conservation and energy efficient technologies). The EIS should consider alternatives to the cable: different routes and no cable. The presenters also requested that the EIS examine geothermal alternatives. They asked that the EIS address the potential use of geothermal energy for further expansion of tourism or industrialization of the Big Island, including such options as deep-sea mining and processing and the proposed Space Port.

Ecological Concerns. It was recommended that the EIS address a wide number of ecological concerns, including impacts on local bird and animal populations; impacts on the threatened, endangered, and endemic species of Wao Kele o Puna rain forest, as well as medicinal herbs and plants and those important to Native Hawaiian culture. They want the EIS to address issues of loss and segmentation of habitat. Commenters were also concerned about the impacts of the submarine cable, particularly emf, on marine species such as humpback whales, skates, rays and sharks. They noted that these species use emf for navigation and location. They also want to know the secondary impacts of the cable on commercial fisheries and tourism.

Socioeconomic Issues. The presenters suggested that the EIS analyze all socioeconomic costs, including financial liability. The EIS should investigate problems that occurred during prior venting/blowout experiences and apply that experience to the proposed action (and alternatives): lower property values (including condemnation), business relocation or loss of business, and increased depreciation due to corrosive atmosphere. The EIS should address the impacts of geothermal development and associated industrialization and growth on life styles in the Puna district (of the general population and specifically of Native Hawaiians).

Native Hawaiian Issues. Finally, more than 30% of the presenters expressed concern that the EIS respect and address the issues of Native Hawaiians who fear that geothermal development will desecrate and anger Pele, destroy Wao Kele o Puna from which they gather herbs necessary for rituals; and desecrate burials which frequently occur in lava tubes.

New, unusual comments. Concern was expressed about the affects of night light. This impact has been of concern in other areas and is of interest not only for its effect on birds and wildlife, but on tourism and on astronomy.

MEETING SUMMARY

Spiegel Presentation - Attachment A

DOE Project/Process Description - Attachment B

Process Discussions. Several process questions arose during the meeting, these included:

NEPA Compliance. The commenters requested that for this EIS, NEPA be strictly adhered to. Dr. Lewis stated that the EIS process being undergone right now is in compliance with NEPA. Information exchange meetings and scoping meetings are part of the process of public participation. In addition, the public will have the chance to review the EIS implementation plan (IP), to review and comment upon the DEIS and FEIS. Dr. Lewis encouraged public participation throughout the entire NEPA process. He also stated that DOE will examine all reasonably foreseeable alternatives to the action.

Funding for Geothermal Development. It was asked whether the federal government would fund projects that will help operations of the current private developers (with permits, in one case obtained without an EIS). Dr. Lewis pointed out that during the EIS process, the federal government was forbidden to spend any federal funds on the HGP except for the purpose of preparing the EIS itself.

Prior and On-going Geothermal Development. The commenters wanted to know if the EIS would examine the prior and on-going geothermal activities in the Puna district. The commenters also wanted to know if the EIS would affect the operations of developers with permits or if the permits would be re-evaluated. Dr. Lewis explained that HGP(A) would not be considered as part of the EIS Proposed Action, however, he agreed that the HGP(A) project would be reexamined from the perspective of its cumulative impacts. He further added that the current development [as distinct from SOH and HGP(A)], will also be considered an important part of the data base, but that much of the data is proprietary. Ms. Borgstrom stated that DOE has a responsibility to look at both the past and present and the reasonably foreseeable geothermal activities in this region in our examination of cumulative impacts; so to that extent HGP(A), SOH, and current developments will be reexamined. Mr. Dennison concurred with and reiterated Ms. Borgstrom's comment. Dr. Lewis further noted that DOE had been guaranteed access to all permits issued by the County of Hawai'i and similar offers had been extended by the geothermal developers.

The president of HELCO stated HELCO's intention to cooperate with DOE on the EIS.

Another commenter noted that the process was long overdue.

Dr. Lewis requested a copy the Goddard and Goddard [report on the 12 June 1991 incident] to aid in the EIS

process; Ed Clark stated that he would provide same.

PRESENTERS Alphabetically, alphanumeric following name indicates number of presentation at Pahoa.

Bonnie Bator	P8
Ed Clark, Puna Community Council	P21
Charles Davis	P18
Ron Dicker	P32
Ole Fulks	P4
Max Goldberger, Hawai'i County Economic Opportunity Council	P3
Helene Hale	P20
Jane Hedtke, Kapoho Community Association	P28
Nelson Ho, Sierra Club	P2
Mokihana Kainoa	P24
Clara Kakalia, Chair of the Land and Natural Resources of Ka Lahui o Hawai'i	P15
Kaliko Kanahele	P35
Alan Kanakaole	P22
Bert Kauhi, Keloha Kai Na O Puna	P5
Bernard Keliikoa	P9
Suzanne Kiriatty	P33
Geoffrey Last	P12
Denver Leaman, President and Executive Director Greenpeace Foundation Hawai'i	P7
Warren Lee, President HELCO	P13
Francois L'Orange	P19
Aurora Martinovich, Lanipuna Gardens Association	P25
Sherrie Moore	P27
Emily Naeole	P30
Lucien Noe'	P6
Robert Petricci	P11
Ron Phillips, Director, Puna Community Council	P26
Steve Phillips	P34
William Reich, Chairman Democratic Party, 1st District	P23
Herbert Ritke	P16
Antonio Rosa	P29
Russell Ruderman, Big Island Rainforest Action Group	P1
Joseph Shaver	P17
Penny Shaver	P14
Alice Suncloud	P10
John Tan	P31

PRESENTATIONS

1. PURPOSE OF PROJECT

Several speakers questioned the objectives of the HGP process.

- Two questioned the validity of the stated purposes of development of geothermal resources (i.e. they

claimed that the State's stated reasons are the development of a dependable, efficient, economic, source of power that will decrease dependence on imported oil).

- HELCO stated that it needs a cost-effective, reliable, power source and to reduce its dependence on oil. HELCO is not now and has no plans to be a geothermal developer.

2. PROPOSED ACTION

2.1 Definition of Project

The presenters noted a need for better definition of the project. One suggested a need for a definitive geothermal development plan for the State with cost analyses of the projects from inception through decommissioning and rehabilitation. Another noted that in order for 500 MW to reach Oahu, 600 MW must be generated, and that DOE should use the 600 MW figure in the Implementation Plan and all further documents. The proposed action should be defined in terms of locations of power plants, wellheads, transmission corridors, and other infrastructure. A presenter asked if facilities will be confined to certain areas.

The presenters had some more specific questions regarding the Proposed Action:

- Why is PGV planning to reinject into a well that could serve as a source?
- How much land will be required or allowed for exploratory drilling?

2.2 Resource Concerns

Several presenters questioned the reliability and renewability of the resource. They asked about the long-term availability of the resource (noting the declining resource in the Geysers in California), and how a declining resource affects cost projections. They expressed concern that development would proceed at great cost *etc.*, when the resource has not been assessed. They want the EIS to investigate the effect of the need for expansion as the resource declines on rates, forests, and the surrounding community.

2.3 Geothermal Project Reliability

More than 25% of the presenters expressed the concern over the high probability of failures, noting the cumulative experience already in Puna (see Section 2.4, Cumulative Impacts), and reminding DOE that the

region is highly unstable, both seismically and volcanically (Section 5.5).

Sufficient concern was expressed to make the failure mode seem to be part of the proposed action (Concerns to be addressed with respect to air and water quality, ecological resources, noise, health and safety, and economics, Sections 5.2, 5.3, 5.4, 5.6, 5.7 and 5.9). Some commenters asked generally that the EIS discuss the impacts of HGP failure. Others were more specific, asking:

- What are the effects of failure (including loss of the cable in the Alenuihaha Channel and overland transmission lines) on users relying on geothermal energy (also Section 2.5)?
- What are the potential impacts of venting due to inability of the operators to control the source wells under extreme isolation conditions (*i.e.* catastrophic loss of cable due to marine seismic event) [also Section 2.5)?
- What would be impacts of the frequent blowouts, and the lack of control thereof, on the residential neighborhood surrounding the site. [Sections 5.1 and 5.7.5, Land-Use and Civil Defense Concerns)?
- What would happen if a well vents uncontrollably and cannot be quenched or capped (*cf.* Geysers experience)? Commenters suggested down-well surveys to determine the status of well casings and to assess the reliability of future similar construction. Well casings may have been damaged by fluids, stresses, or seismic events.

2.3.1 Mitigation Methods

With respect to mitigation of impacts of the geothermal activities the presenters requested the following:

- Will the EIS address the problem of disposal of hazardous waste?
 - Apparently drilling muds are exempt from federal hazardous-waste disposal laws.
- The EIS should determine the best available control technology (BACT) for upset conditions. What backup abatement process will be available should mitigation fail (in addition to rock mufflers for noise suppression, caustic soda for H₂S abatement, and holding ponds)?
- The EIS should address the problem of reforestation after decommissioning the HGP (or part of it) and state the requirements. (also Section 5.4.2) Has reforestation of the Wao Kele o Puna or surrounding

rainforests ever been successfully accomplished? Examples should be given that include the following information: a description of the reforestation technique employed; the cost and hours of labor and maintenance per acre; for each area, degree of disturbance, condition prior to reforestation, its degree of isolation from other disturbed areas; amount of time since inception of reforestation; height and circumference of the largest ohia trees; type of lava/soil; distribution of exotic species, including but not limited to: aluli (?sp.), Hapu fern. What reforestation techniques will be used and who will be responsible for reforestation? Will the EIS recommend reforestation of Wao Kele o Puna or other mitigation measures as a condition for further federal funding?

- The EIS should assure that appropriate monitoring and well fluid characterization is done by qualified people.

2.4 Cumulative Impacts of Prior and On-going Geothermal Development

The presenters, in general, do not hold either the past or present geothermal developers in high regard (suggesting that the many failures are due to improper operation). At least 20% of the presenters noted that in the past and present geothermal activities, community and individual rights, health, safety, property have been violated.

- They expressed concern that the leaks, blowouts, and uncontrolled venting from prior and on-going geothermal ventures have set a precedent for the future and they questioned, given the problems that have occurred at the ~2.5 and 25 MW scale, what will happen should 500-600 MW be developed.
- They recommended that the EIS investigate the problems that occurred during prior geothermal experiences and apply that information to assessment of impacts of the proposed action and alternatives (see Section 2.3).
- The presenters also noted that environmental examination of geothermal development to date has been segmented, inadequate, and performed using a very limited data base and perspective, *i.e.* the Scientific Observation Hole (SOH) program was permitted separately and so on. The SOH Environmental Assessment (for the State of Hawai'i) did not address the reasonably foreseeable consequences of a successful SOH project. They noted that the EIS for HGP(A) was an inadequate document and that its conditions for operation and mitigation, as described in the EA, were not followed.

2.5 Cable/Transmission Lines

Presenters want the EIS to identify all segments of transmission lines.

They asked if the grid on Hawai'i can safely distribute the power associated with HGP. They expressed concern that the grid on Hawai'i was too fragile to accept even the 25 MW planned from PGV. How will the system deal with additional increments of power up to 500 MW?

They questioned the reliability of the cable (noting reported failures: Chugach Electrical Association suing Pirelli over a cable that continuously leaks oil in Cook Inlet). They were particularly concerned about cable reliability in the Alenuihaha Channel, given its depth and bottom roughness (see Section 2.3).

2.6 Future Uses

The EIS should address the impacts of reasonably foreseeable uses of geothermal energy. These include using geothermal energy on Hawai'i to develop reasonably foreseeable uses, such as expanded tourism, the space port and Mn nodule mining. [DOE was referred to a State/Federal EIS on manganese nodule mining/refining powered by geothermal energy (ca. 1982/4).]

3. ALTERNATIVES TO THE PROPOSED ACTION

3.1 Conservation and Renewables

A number of the presenters (~30%) requested that the EIS explore any and all alternatives to geothermal development including solar technologies (passive and active including: photovoltaics, solar thermal, solar hot water heating, and off-grid equivalents), wind (centralized and off-grid, noting its success in California), ocean thermal energy conversion (OTEC) and demand-side management (conservation, energy efficient technologies). The EIS should include:

- a cost comparison between the geothermal project and use of an aggressive conservation program (effect on rates, State economy), which might save 25 MW locally, 500 MW statewide,
- a comparison of the relative risks, costs (to rate and tax payers and investors) of the full geothermal development and energy efficiency coupled with integrated resource planning, and

- the possibility of providing low cost loans for personal solar hot water (*etc.*) systems.

A suggestion was made concerning the use of hydrogen for power generation.

3.2 Geothermal Alternatives

The EIS should examine other forms of geothermal power generation, for example, *in-situ* heat-exchange geothermal.

3.3 Alternatives to the Cable/Transmission Lines

The EIS should examine alternative methods of power transmission.

3.4 Transportation

The topic of transportation arose with respect to one of the State's goals for the HGP: to reduce Hawai'i's dependence on imported oil. The commenter noted that through the introduction of alternative forms of transportation, Hawai'i could reduce its dependence on imported oil. He asked about the possibility of using hydrogen for transportation.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

One presenter requested site specific surveys of the affected environment; other presenters requested that:

- local meteorology be characterized,
- natural (ambient) emissions be quantified,
- plant and animal surveys of Kilauea East Rift Zone region, and all the proposed overland and undersea transmission corridors based on Habitat Evaluation Procedures of USFWS be carried out, and
- seismic tomography be used to describe the geological structure of the Kilauea East Rift Zone Region.

5. POTENTIAL ENVIRONMENTAL ISSUES

Several commenters addressed general concerns:

- What are the impacts of geothermal development on water quality, air quality and the ecology of the

affected environment?

- There is a concern that geothermal development has caused/will cause decline of property values, poor air quality, acid rain, and toxic rain water.
- Speaking generally, one commenter noted that the EIS should analyze all socioeconomic and environmental costs if some portion of the operation fails (Section 2.3) and suggested that the preparers use prior experiences as models for scale up (Section 2.4).
- What are the long-term impacts on the affected environment?

5.1 Competing Uses

The most commonly mentioned land-use issue was that of geothermal development in a residential community that has the fastest growing school in the State, particularly noting the toxic nature of the releases (Section 5.7), the corrosive nature of the releases causing problems of rusting catchments *etc.* (Section 5.2), and the instability of the resource due to its volcanic origin (Sections 2.3, 5.5).

The commenters also questioned land use choices for native Hawaiian homelands and ceded lands, and also questioned the exchange of Wao Kele o Puna rainforest for the Campbell Estate land (also Section 5.8).

5.2 Air Quality Concerns

Presenters asked about the impacts of geothermal development on air quality, noting that the emissions have not been adequately characterized. Emissions could include (but are not limited to) H₂S, Pb, As, Hg, SiO₂. Concern was expressed that geothermal development has caused/will cause poor air quality, acid rain, and toxic rain water.

Another presenter suggested the possibility of gases migrating through cracked well casings to ground water or to vents, creating fumaroles.

Many of the air quality concerns are also health and safety concerns and appear in Section 5.7. Other issues include:

- concern that emissions would cause acid rain resulting in excessive corrosion of piping or building materials or that emissions would discolor or erode paint *etc.*, and
- Unique local meteorological conditions may concentrate toxic substances in drinking water (catchments). This air quality issue results in a water quality issue (Section 5.3).

The commenters believe that State/federal governments should enforce the laws currently in existence. They noted that the State has never set air quality standards for H₂S [also Section 5.8]. They asked if regulations have been violated in the past, are they currently being violated and will they be in the future?

5.3 Water Quality Issues

The presenters want the EIS to characterize the components of geothermal effluents (including, but not limited to H₂S, Pb, As, Hg, SiO₂, SO₂).

Most of the water quality issues are also health and safety issues (Section 5.7) as they affect drinking water either in catchments or underground aquifers used for drinking under the drought conditions prevalent now. They are concerned with the State's relaxation of water quality standards for aquifers in the Puna District (Section 5.8). They asked if regulations have been violated in the past, are they currently being violated and will they be in the future?

Presenters want the EIS to investigate what will happen to groundwater quantity and quality due to effects of drilling, operating source and reinjection wells (reinjection wells are also possible source wells), and induced seismic/volcanic disturbance. They want to know how wells will be kept from leaking into aquifers under normal operating conditions or in failure modes due to seismic/volcanic activity or casing failure due to corrosion. They noted the possibility of fluids migrating through cracked well casings to ground water. They noted the need for large volumes of water to drill and quench blowouts.

Presenters are also concerned about geothermal development affecting water availability.

5.4 Ecological Resources

Commenters expressed the need for surveys of biota (Section 4, Affected Environment) in order to assess impacts.

5.4.1 Impacts to Terrestrial and Land-based Aquatic Ecosystems

Presenters want the EIS to investigate the impact of geothermal emissions, noise, venting, night-light (Section 5.6.2) and blowouts on pets, livestock, local bird and animal populations, noting fewer birds (doves, cardinals *etc.*) and affected wildlife since the blowout.

- One suggested that subjecting animals to geothermal emissions is premeditated cruelty to animals.

Presenters noted that studies need to investigate impacts to the ecosystem traversed by the transmission lines, particularly with respect to emf and electromagnetic radiation [also, but not exclusively Section 5.7, Health and Safety]. They also mentioned the problem of night light affecting sensitive species.

5.4.2 Rain Forest Issues.

The presenters are particularly concerned with the impacts of the HGP on Wao Kele o Puna rainforest, both as a vital habitat and a sacred preserve for Native Hawaiian plants used in rituals. They ask:

- What are the impacts of disturbance in the rain forest, including secondary impacts?
- that the EIS assure that project does not destroy the unique species (threatened, endangered or endemic, particularly those that may have medicinal value, and those that are important to Native Hawaiian religion) and ecosystem in the Wao Kele o Puna rainforest.

5.4.3 Threatened, endangered, or endemic species concerns

Commenters expressed the need for plant and animal surveys (Section 4, Affected Environment) in order to assess impacts threatened, endangered, and endemic species as well as those on the candidate list.

5.4.4 Marine Concerns

Of the impacts to marine ecosystems, the presenters at this meeting are most concerned about the impacts that the emf generated by the cable might have on sensitive marine species. They suggested that the EIS investigate the impacts of cable operation on the ability of whales, dolphins, sharks, rays, skates *etc.* to navigate/locate. [The commenter noted that whales, dolphins, turtles *etc.* have magnetite in their forebrains and use very weak magnetic fields for navigation and location and that sharks use electrical fields generated by their prey to locate

their prey.] They want the EIS to investigate the:

- effect of emf on marine species, especially with respect to altering desirability of birthing/calving or resting locations for humpback whales,
- the potential for electrotaxis effects (electric fields causing organisms to swim in the direction of the field) on marine organisms,
- any potential impacts on commercial fisheries, especially on the Penguin Banks, and
- the impact on tourism and local communities if operations attract or provoke sharks. [Ref. to shark attacks on telecommunication cables in the Atlantic.]

5.5 Geological Issues

The commenters expressed concern that undertaking geothermal development in a seismically and volcanically active zone may, in fact, exacerbate those activities and upset the hydrological balance as the development will be situated on a geological structure that contains numerous vertical dikes, faults, and horizontal shelves. A commenter noted that the area is rated Volcano Hazard Zone Number 1.

- One presenter expressed concern with the impacts on and from Kilauea inflation and deflation. Another commenter inquired if geothermal activity causes or increases the risk of either seismic or volcanic events (mentioning Mt. Pinatubo, Philippines, Guatemala), and asked how these increased activities would impact surrounding communities?
- The EIS should address the concern that the complex geological formation might cause failures in the geothermal system, cutting off source reservoirs during operation, and causing uncontrolled venting during operation or after decommissioning. They referred to failures experienced in Iceland due to seismic activity in a volcanic zone. The possibility of lava emerging through wells (*cf.* Iceland) was mentioned.

5.6 Aesthetic Issues

5.6.1 *Noise*

Noise is primarily considered a Health and Safety Issue, Section 5.7.3, but also affects the aesthetics of an area. It might also affect life style (Section 5.9.2). Commenters (~10%) want the EIS to address the impacts of noise associated with geothermal development, including drilling, operation and venting. They note that noise is a nuisance, disrupting peace and quiet.

5.6.2 *Visual Issues*

One commenter requested that the EIS address the impacts of night-time lighting during well-drilling, construction, and operation of the geothermal plants and associated infrastructure [including transmission facilities], especially with regard to the Newell's Shearwater that traverses the area. This issue has been an important concern in other EISs (also Sections 5.4.1 and 5.9.1).

5.7 Health and Safety Issues

5.7.1 *Geothermal Emissions and Effluents*

Forty percent of the commenters expressed concerns about the health and safety issues; most expressed concern about the impacts of geothermal emissions on air quality, drinking water quality in their catchment systems, and on foodstuffs. The commenters noted that a report by Goddard and Goddard lists a variety of health effects associated with geothermal emissions, notably H₂S, including eye and throat irritation, noise irritation, trouble breathing, coughing, wheezing. They further stated that after the KS7 blowout, planned venting in March, 31-hr blowout of KS8, and leak of KS3 for 8.5 hrs, Puna district residents experienced health effects that resulted in numerous hospital and doctor visits and evacuation.

They were concerned about the cumulative effects of H₂S and other components of emissions, effluents, brine ponds (including, but not limited to H₂S, Pb, As, Hg, SiO₂) on children and babies, those with respiratory ailments (asthma, emphysema, chronic bronchitis *etc.*), elderly, native Hawaiians, and workers. They stated that H₂S concentrations from local geothermal development permitted emissions are four times those permitted at the Geysers. They also referred to health effects as a result of prior and on-going activities, *e.g.* during a 3-month unabated venting, asking that the EIS:

- address contamination of water catchment systems with, for example, Rn, H₂S, Pb, Hg *etc.* including its affect on children, aged, infirm, and highly sensitive individuals;

- investigate the synergistic effects of combinations of pollutants: H₂S, Pb, Hg, As, ²²²Rn, boric acid, benzene, F, Cl, SiO₂, SO₂, NH₃ etc;
- analyze the short- and long-term costs of geothermal production in terms of loss of life and public health and safety.

5.7.2 Transmission Line Effects

The presenters stated that the EIS should investigate impacts associated with land traversed by the transmission lines, particularly with respect to emf and emr (noted studies by Edison Electrical Institute, EPRI, and US Office of Technology Assessment that associate cancer with emf and emr).

5.7.3 Noise

Commenters (~10%) want the EIS to address the impacts of noise associated with geothermal development, including drilling, operations, and venting. They note that noise can cause ear damage; and it can cause fear, loss of sleep, and psychological stress (Section 5.7.4).

5.7.4 Psychological Impacts

About 20% of the commenters mentioned psychological impacts. The commenters believe that the EIS should:

- address the problem of the fears of geothermal development that exist in the surrounding communities due to the prior activities in the region.
- ask what the psychological impacts are on a community experiencing controversy, lack of empowerment, and loss of due process.
- address the impacts of stress due to fear, unannounced venting, and sleep deprivation (due to noise, fear, frustration, and lack of trust).

5.7.5 Safety, Civil Defense Issues

With respect to the problems of geothermal development in a residential area, the commenters strongly urged

that the EIS consider the following civil defense issues. These are also health and safety concerns (Section 5.7). The EIS should:

- develop a worst-case scenario based on item 20 in the amended Emergency Response Plan recently submitted by PGV for the full development.
- address the problem that there is no adequate emergency response plan even for a 25 MW facility. One presenter noted that the fire department is frequently unaware of the need to evacuate. Another noted that there is no evacuation route.
- develop an appropriate emergency response plan for Puna District.

One commenter mentioned the hazards associated with shark attacks, should sharks be attracted by cable operations.

5.8 Political Issues

The majority of presenters (~75%) expressed political concerns of one kind or another. These comments were in regard to a lack of concern by government, loss of due process because of government regulations and actions, loss of faith in government, lack of enforcement of rules and regulations (including permitting and monitoring requirements) by government, and lack of necessary expertise within government. The commenters mentioned infringement on privacy due to the actions of geothermal developers' security personnel.

5.9 Socioeconomic Issues

The presenters want the EIS to analyze all socioeconomic and environmental costs if a blowout or "kick" occurs (Section 2.3) using prior experiences as models for scale up (Section 2.4).

5.9.1 *Economic Issues*

- The commenters expressed concerns over the economics of developing with a resource that has not been evaluated and may decline (Section 2.2).
- The EIS should determine whether the HGP is economically viable.

- The presenters requested an analysis of the short- and long-term costs of geothermal production on property values and utility rates.
- The EIS should investigate as potential problems, those that have occurred in other geothermal development: lower property values (including condemnation), business relocation or loss of business, and increased depreciation due to geothermal-related corrosion.
- The EIS should identify who is liable - the federal government, the State, and/or privately-owned corporations - for all costs incurred and should mandate that conditions of permits should include future liability clauses. As the HGP will be operating in a Hazard Zone 1-2 (seismic and volcanic), some consideration of the probable cost increase for insurance (estimated at ~3 times the norm) should be given.
- Other economic concerns are also mentioned in Section 5.4.4, Marine Concerns and Section 5.6.2, Aesthetic Issues, and refer to impacts on fishing, tourism, and astronomy.

5.9.2 Life Style

The presenters want the EIS to address two basic life style issues, the potential for geothermal development to have a negative impact on:

- Native Hawaiian life style.
- the quiet, peaceful life style of all residents of the Puna district.

The presenters also want the EIS to:

- investigate the potential impacts of development in terms of expanded tourism or industrialization on Hawai'i, noting the State's proposed ocean mining and refining development and space port activity (Section 2.6).

5.9.3 Social Issues

5.9.4 Native Hawaiian Issues

More than 30% of the commenters expressed concern that the geothermal development will negatively impact

Native Hawaiian culture. They want the EIS to:

- address the issue that geothermal development will desecrate Kilauea, the embodiment of Tutu Pele.
- assure that the project does not destroy unique species, particularly those that may have medicinal value and those that are important to Native Hawaiian religion in the Wao Kele o Puna rain forest. These herbs are critical for Native Hawaiian gatherers; their loss will negatively impact Native Hawaiian religion.
- investigate the possible impacts of the HGP project on Native Hawaiian burial grounds.
- address the fact that Native Hawaiians are an endangered species.

5.9.5 Impacts to Cultural Resources (Archeological/Historical Sites and Regions)

6. COST BENEFIT ANALYSIS

The presenters would like the EIS to address the concern that those who will bear the greatest cost in terms of health and safety, economics, cultural resources, and environmental losses, will not be the ones to benefit. They would, therefore, like the EIS to establish what the benefits of the HGP are and who benefits. [Environmental and economic issues are largely mentioned in Section 5, above, so the following reflect questions regarding the recipients of the benefits.]

- Which industries and who else will benefit from geothermal development, Mn nodule mining/refining, or the space port?
- Who (specifically what investors to a very detailed level) will profit from the development of geothermal power and the increased development that it will make possible on the Big Island?

7. LEGAL ISSUES

The EIS should review of all applicable rules, regulations and statutes, including OSHA and NEPA.

ATTACHMENT A

FACILITATOR PRESENTATION

HAWAII SCOPING MEETINGS

March 7, 1992, Pahoa, Hawai'i
March 9, 1992, Wailuku, Maui
March 12, 1992, Kaunakakai, Moloka'i
March 14, 1992, Honolulu, Oahu
March 16, 1992, Waimea, Hawai'i

Summary of Presentation

Introduction: Mr. Spiegel first introduced himself and Ms. Letts, from West Hawai'i Mediation Services and the Center for Alternative Dispute Resolution, respectively, as professional facilitators. He explained that they were hired to run a fair and impartial scoping meeting. He then introduced Dr. Lewis [Hawai'i Geothermal Project (HGP) Environmental Impact Statement (EIS) Program Director from DOE Headquarters], Carol Borgstrom, Director of the Office of National Environmental Policy Act Oversight, DOE Headquarters], and William Dennison [Assistant General Counsel for the Environment, DOE Headquarters]. The facilitator then stated that his purpose was to remain neutral and keep the meeting on track.

Structure of Meeting: The attendees were advised as follows. The intent of the meeting was to identify issues and concerns that those present had concerning the HGP. The facilitators will do their best to assure that everyone gets to be heard. Only questions with regard to process will be answered. In order to assure this, those who wish to speak will give their presentation in the order that they have registered; individuals will have 5 minutes and organizations and elected officials will have 10 minutes. Speakers are to identify themselves and the group they represent. Those who wish to speak should register; speakers may speak at only one of the planned scoping meetings; if anyone needs more time to finish, he/she may reregister, and time-permitting, will be given an additional 5/10 minutes, as appropriate. If a presentation is to be given in Hawaiian, an interpreter is available. If necessary, time will be extended as possible. In each meeting there will be a 10 minute break about half way through the meeting. Any written materials can be handed in at the meetings or sent to Dr. Lewis at DOE before 15 April 1992 to assure consideration. Each meeting will be recorded by a court reporter, and tape and video recorders to assure an accurate record of presentations. If requested, the video recorder can be turned off. Transcripts of the meetings will be available in 21 reading rooms in Hawai'i and on the mainland. Attendees were invited to have their names placed on the EIS mailing list (sign up at registration desk) to receive any future EIS-related notices.

Ground Rules: The facilitator requested that those present be courteous to each other, that they do not interrupt

speakers, and stay within the designated time limits. Private conversations and interviews should be conducted outside the meeting room. Dr. Lewis is available for interviews prior to each meeting and at the breaks.

NEPA Background: The scoping meetings were shown to occur between the Notice of Intent (NOI) and the production of the EIS Implementation Plan (IP). Following preparation of the IP, a Draft EIS (DEIS) will be prepared. After public review of the DEIS, a FEIS is available for public review. A total of ten scoping meetings would be held with two each day in Pahoa, Wailuku, Kaunakakai, Honolulu, and Waimea (afternoon, 2-5:30 PM and evening 7-10:30 PM).

Turns meeting over to Dr. Lewis for further comment.

ATTACHMENT B

DOE PROJECT/PROCESS DESCRIPTION

HAWAII SCOPING MEETINGS

March 7, 1992, Paho, Hawai'i
March 9, 1992, Wailuku, Maui
March 12, 1992, Kaunakakai, Moloka'i
March 14, 1992, Honolulu, Oahu
March 16, 1992, Waimea, Hawai'i

Summary of Presentation

Introduction: After introducing himself as the Program Director for the Hawaii Geothermal Project Environmental Impact Statement (HGP EIS), Dr. Lewis began his presentation by stating that DOE's mission is "to prepare an Environmental Impact Statement (EIS) for phases 3 and 4 of the Hawaii Geothermal Project (HGP) as defined by the State of Hawaii in its proposal to Congress in 1989," noting that the Proposed Action had been defined by Congress (3/91) and the US District Court in Hawaii (6/91). He then explained that phases 1 [exploration, HGP(A)] and 2 [test of the feasibility of laying and retrieving the submarine cable] were complete. He noted that they were funded by DOE, the State of Hawai'i, and others and had undergone NEPA review. He stated that although phases 1 and 2 had had environmental review, they form an important data base and would be reexamined from the perspective of cumulative impacts. He also noted that the EIS would examine a range of reasonably foreseeable alternatives, both within and outside geothermal.

He then acknowledged Carol Borgstrom, Director of the Office of National Environmental Policy Act Oversight, DOE Headquarters], noting that she was assisted by Dr. Yvonne Weber, and also William Dennison [Assistant General Counsel for the Environment, DOE Headquarters], recognizing his assistance by Janine Sweeney. He introduced the representatives from DOE-OR (Andrea Campbell); ORNL, assisting in the preparation of the EIS (Dr. Amy Wolfe, Dr. Virginia Tolbert), and LBL, cable and alternatives (Mary Hunt). The latter were also to assist in recording highlights of scoping meetings.

EIS Process: Dr. Lewis described the EIS process. Initially an Advance Notice of Intent was published; 55 letters and hundreds of comments were received in response. Next were information exchange meetings with various civic, environmental, and Native Hawaiian groups, utilities, museums, developers, and potential cooperating agencies, including several federal, State, and County departments. At these meetings, concerns and issues were raised. He noted that several agencies would probably elect cooperating agency status. Cooperating agencies can include federal agencies, States, county governments and Native American Nations. He noted that although Native Hawaiians do not currently have Nation status, DOE would be holding many information

DRAFT: DOE Presentation Summary (6/4/92)

exchange meetings with Native Hawaiian groups, trying to accord them the status of cooperating status to the extent possible. These meetings were followed by a Notice of Intent announcing scoping meetings.

On Hawaii meetings included: County of Hawaii Mayor's Energy Advisory Commission. Meetings were also held with Big Island Rainforest Action Group with Malu Aina, Citizens for Responsible Energy Development with Aloha Aina, Greenpeace Hawaii, Hawaii Island Geothermal Alliance, Kapoho Community Association, Lanipuna Gardens Association, Pele Defense fund, Puna Community Council, West Hawaii Sierra Club.

Dr. Lewis then turned the meeting over to the Facilitator for process questions.

SCOPING MEETING SUMMARY

Mary S. Quinby-Hunt

8 June 1992

PAHOA, HAWAII, 7 March 1992, 7 PM SESSION

OVERVIEW

The meeting began with presentations by the facilitator, Ms. Letts, and Dr. Lewis from DOE. The facilitator introduced those on the podium. He then described the general structure of the meeting and its purpose: to hear the issues and concerns of those present regarding the proposed Hawaiian Geothermal Project. He described his role as assuring the impartiality and fairness of the meeting. Dr. Lewis further defined the scope of the project, introduced members of the EIS team, and briefly described the EIS process.

Nearly all (>90%) of the presenters were concerned with health and safety issues, and a majority (>60%) were concerned about the potential impacts of geothermal emissions associated with unabated or uncontrolled venting. About 40% were concerned with water-quality-related health issues. The commenters (more than 50%) noted that their prior experience with geothermal development has not been positive, referring to numerous incidences of unabated venting, some planned, others uncontrolled. 30% of the commenters mentioned psychological impacts, such as fear, stress, and loss of sleep.

Roughly, 60% of the presenters criticized the government's role in permitting and monitoring and in providing information regarding the health and safety of those affected by the current geothermal development. They expressed frustration and a feeling of lack of consideration for their concerns by government.

A number of other issues were presented. The presenters want the HGP and its objectives better defined, including the boundaries of the affected region. They questioned the reliability of both the geothermal and cable portions of the project, citing numerous failures in the past. They noted that some earlier failures were due to improper operation, but expressed concern that seismic or volcanic events also might disrupt operations. They want the development that might reasonably be expected with provision of geothermal power to be assessed, such as large hotels or deep-sea minerals mining and refining. More than 30% of the presenters requested that the EIS explore alternatives to the Proposed Action. They mentioned solar technologies, wind, biomass, and others.

Land-use issues were important to more than 40% of the commenters, who view development of geothermal power in a residential neighborhood as inappropriate. They asked that the EIS address many concerns about an emergency-response plan, including logistics details, meteorological modelling, required equipment, and cost liability. They noted that the road to Kea'au, which is paralleled by transmission lines, is the only access route,

which makes both the road and the lines highly vulnerable.

Some commenters were concerned about the impacts of the HGP on local birds, wildlife, and livestock. Others were concerned about the introduction of exotic species into the rainforest and illegal collecting of endangered species.

Commenters were concerned with aesthetics, visual effects, noise and smells, associated with HGP. They were also concerned about impacts of HGP on local life style. Presenters wanted the EIS to address Native Hawaiian concerns. They also want the EIS to address economic concerns, including lower property values, loss of livestock, accelerated depreciation of facilities, and the impact of expenditures for geothermal development at the expense of other projects. Finally, the commenters asked DOE to examine who would benefit from the project and who would pay the costs.

MEETING SUMMARY

Letts Presentation - Attachment A

DOE Project/Process Description - Attachment B

Process Discussions. In general statements, commenters noted that the EIS should have been done years ago. One was concerned that while EIS is being done, private developers are allowed to continue developing geothermal, noting that rainforest is being cut while the EIS is being completed. He wished to know to what extent are ORMAT and True/Mid-Pacific included in the action.

In response to commenters statements/questions, Dr. Lewis made the following clarifications:

- The construction of the small plants on the Big Island are to meet that island's needs, whereas the HGP will supply its 500 MW to Oahu.
- With respect to the issue of enforcement, Dr. Lewis noted that the HGP is not a federal project and therefore, the federal government would only have the authority to enforce the permits that it issues.
- With respect to federal funding and association of prior and on-going geothermal development with HGP, Dr. Lewis explained that as part of the U.S. District Court decision, DOE is prohibited from expending funds for HGP-HDWC program with the exception of the moneys needed to prepare the EIS. With regard to getting data from prior activities, he further noted that the True/Mid-Pacific and PGV operations were not federally funded, so it was unclear whether their data would be available. He noted that the HGP(A) project was a federal program [although it had been turned over to the State] and the Scientific Observation Hole program was to some degree USGS-funded so that data from both of these projects would be available. Obtaining data from proprietary prior projects was unclear at this time.

PRESENTERS Alphabetically, alphanumeric following name indicates number of presentation at Pahoa.

Jim Albertini, Malu Aina Center for Non-violent Education and Action	P36
Virginia Aste	P48
Gary W. Barnett	P46
Jennifer Gold, Mothers for Peace	P43
Toby Hazel, Puna Community Council, Health and Safety	P39
Alan Kanakaole	P22
Christine Kubat	P49
Ray Lake	P47
Randy Lee	P50
Jonathan Naone	P51
Jon Olson, Lanipuna Gardens Assoc., Member Citizens' Advisory Panel	P41
Athena Peanut	P45
Jennifer Perry, Kapoho Community Organization	P44

Robert Petricci
Deborah Pommerenk
Greg Pommerenk
Rene Siracusa
Janice Wilson

P11
P40
P38
P37
P42

PRESENTATIONS

1. PURPOSE OF PROJECT

One commenter questioned the State's stated purpose for the HGP (to relieve reliance on imported oil) because Hawai'i's Governor vetoed a bill requiring solar hot water heating on all low-cost housing (also Section 3.1).

Another suggested that EIS needs to clarify the purpose of bringing 600 MW of geothermal power on line considering that power generating capacity of the State is being expanded in many other locations (163 MW in No. Kona; West Hawaii paper reports 40 MW plant that is fired by residual oil).

2. PROPOSED ACTION

2.1 Definition of Project

The presenters wanted better definition of the project, noting that in order for 500 MW to reach Oahu, 600 MW must be generated. The EIS should define the regions affected by the proposed action. It should describe the actual development that will occur within the geothermal zone, noting that it was unclear from information currently available whether the entire region would be filled with wells or not.

The impacts of the cable should be considered in the EIS.

2.2 Resource Concerns

2.3 Geothermal Project Reliability

More than 30% of the presenters specifically expressed concern over the high probability of failures, noting the cumulative experience already in Puna (see below Section 2.4, Cumulative Impacts), and reminding DOE that the region is highly unstable both seismically and volcanically (Section 5.5). Others remarked that some of the failures of the geothermal development to date must be attributed to human failure.

Others were concerned about the impact on the geothermal facility if HELCO [or for that matter HECO or MECO] goes down? If the system is isolated from the grid, what will be the effect of venting from 200 wells?

Sufficient concern was expressed to make the failure mode seem to be part of the proposed action. The EIS should estimate how often failures might be expected. [Concerns to be addressed with respect to air and water quality, ecological resources, noise, health and safety, and economics, Sections 5.2, 5.3, 5.4, 5.6, 5.7 and 5.9.]

2.3.1 *Mitigation Methods*

With respect to mitigation of impacts of the geothermal activities, one commenter noted that the developers are required to use best available control technology and asked if the geothermal developers will be responsible for keeping up with developments in control technology.

2.4 Cumulative Impacts of Prior and On-going Geothermal Development

The presenters do not generally hold either the past or present geothermal development or developers in high regard (suggesting that the many failures are due to improper operation and providing tapes of the 12 June 1991 well blowout). One commenter noted that PGV should not have had the accident on 12 June 1991; fluid temperatures were high prior to the incident and experienced operators would have been aware of a potential problem.

At least 50% of the presenters noted that in the past and present geothermal activities, there were numerous failures, and that community and individual rights, health, safety, and property, were violated.

- They expressed concern that the leaks, blowouts, and uncontrolled venting from prior and on-going geothermal ventures set a precedent for the future and they questioned, given the problems that have occurred with 1 well, what will happen should 200 be drilled.
- The commenters expressed concern that, to date, geothermal developers have not provided citizens with accurate information concerning their operations and releases. One commenter was concerned that the present roads facilitate illegal hapu'u logging in the rain forest, and may set a precedent for future activities. Another noted that True/Mid-Pacific overharvested what their permit allowed, but were not required to reforest the area.
- One commenter suggested that incursion of exotic plants and animals into the Wao Kele o Puna rainforest has already occurred and may accelerate due to HGP.
- EIS should investigate and learn from the problems that occurred during prior geothermal experiences and

apply that information to the proposed action and alternatives (see section 2.3). One commenter noted that fallout from PGV lands on his roof (2300' from PGV) during blowouts and unabated venting; several noted that during such incidents their families and livestock experienced serious health effects. [This concern has air and water quality (Sections 5.2 and 5.3), health and safety (Section 5.7.1), and economic (Section 5.9.1) implications, as well as land use relevance (Section 5.1).] Others noted noise and psychological effects, including fear and loss of sleep (Sections 5.7.3 and 5.7.4).

- Many commenters asked about the extent that prior and current geothermal development activities [ORMAT (PGV) and True/Mid-Pacific] would be addressed in the EIS. The EIS should delineate the State and federal involvement in the HGP(A), SOH, Thermal Power True, ORMAT, and PGV projects.

2.5 Cable/Transmission Lines

Presenters want the EIS to identify all segments of transmission lines.

They asked whether the grid on Hawaii could safely distribute the power associated with HGP.

Many questioned the reliability of the cable in the event of natural disaster requesting that the EIS should assess the impacts of cable failure due to earthquakes, lava flows, or fire. They expressed concern that parallel transmission lines along the Kea'au road makes the system vulnerable [to seismic events, volcanic events, extreme events (storms), sabotage]. They noted that if lines are broken, any escape route could also be cut off (also Section 5.7.5).

2.6 Future Uses

The EIS should address the impacts of reasonably foreseeable uses of geothermal energy, including development for U.S. military interests. The EIS should examine the possibility that the availability of 500 MW more power available will lead to development of large centralized industries, such as seabed minerals mining and refining on Hawai'i, and construction large energy-intensive hotels.

3. ALTERNATIVES TO THE PROPOSED ACTION

3.1 Conservation and Renewables

A number of the presenters (~30%) requested that the EIS explore alternatives to geothermal development including solar technologies (including solar thermal, solar hot water heating, and off-grid equivalents), wind (centralized and off-grid, noting its success in California), ocean thermal energy conversion (OTEC), tidal, and

hydrogen. They wanted the EIS to examine the possibility for loans for retrofitting and requirements for new construction to have various systems such as solar hot water heating *etc.*

3.2 Geothermal Alternatives

3.3 Alternatives to the Cable/Transmission Lines

3.4 Transportation

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Presenters requested that the EIS:

- investigate the local meteorology of the Puna District to enable DOE to assess the impacts of HGP.
- provide information concerning the socioeconomic makeup of the Puna District. The commenter mentioned the high numbers of single parents and Native Hawaiians, the low average incomes, the poor condition of the roads in the region, and the fact that most residents are on water catchment systems.
- present a baseline health study of the region impacted by HGP (the commenter noted that one should have been done 10 years earlier).
- establish baselines characterizing ground water supplies.

5. POTENTIAL ENVIRONMENTAL ISSUES

5.1 Competing Uses

The commonly mentioned land-use issue was that of geothermal development in a rapidly growing residential community (with the fastest growing school in the State), particularly noting the toxic nature of the releases (Section 5.7), the corrosive nature of the releases causing problems of rusting catchments *etc.* (Section 5.2), and the instability of the resource due to its volcanic origin (Sections 2.3, 5.5).

5.2 Air Quality Concerns

The EIS should address the impacts of geothermal development on air quality, noting that the emissions have not been adequately characterized and should be (H₂S, Pb, particulates, and ²²²Rn were mentioned specifically).

Many of the air quality concerns are also health and safety concerns and appear in Section 5.7. Other issues include concern that:

- emissions would cause acid rain resulting in excessive corrosion, discoloration, or erosion;

- unique local meteorological conditions, such as air "stacking" followed by intense rain may concentrate toxic substances in drinking water (catchments); [This air quality issue results in a water quality issue (Section 5.3).]
- geothermal emissions contaminate water supply and gardens (also Sections 5.3, Water Quality, and 5.7 Health and Safety).

The commenters believe that State/federal governments should enforce the laws currently in existence, including requirements for monitoring in appropriate locations by qualified analysts (U.S. Geological Survey was mentioned by one commenter). They asked if regulations have been violated in the past, are they currently being violated, and will they be in the future?

5.3 Water Quality Issues

The presenters want the EIS to characterize the components of geothermal effluents and local drinking water. One noted that data could be collected by the U.S. Geological Survey. The commenters want the EIS to assure that appropriate monitoring will occur.

Most of the water quality issues are also health and safety issues (Section 5.7) as they affect drinking water either in catchments (some commenters believe that their catchments have already been affected as a result of prior unabated ventings) or underground aquifers. Commenters are concerned with the State's relaxation of water quality standards for aquifers in the Puna District in support of geothermal development (Section 5.8).

Some presenters want the EIS to investigate what will happen to ground water if geothermal wells *etc.* fail (Ref. geothermal fluids may travel horizontally).

5.4 Ecological Resources

5.4.1 *Impacts on Terrestrial and Land-based Aquatic Ecosystems*

Presenters want the EIS to investigate the impact of geothermal emissions, blowouts on pets, livestock, local bird and animal populations, noting fewer birds and affected wildlife since the blowout (also Section 5.9.1). Commenters noted the livestock lost during prior incidents (also Section 2.4). They also noted loss of birds during and immediately following incidents.

5.4.2 *Rain Forest Issues*

The EIS should consider the impacts of geothermal development on the rain forest and develop a mitigation

plan. One commenter was concerned that the present roads are permitting incursion of exotic plants and animals into the Wao Kele o Puna rain forest, thereby setting a precedent for future activities.

5.4.3 Threatened, endangered, or endemic species concerns

One commenter expressed concern that roads into the rainforest would facilitate illegal collecting endangered species (e.g. hapu'u).

5.4.4 Marine Concerns

5.5 Geological Issues

The commenters expressed concern that undertaking geothermal development in a seismically and volcanically active zone may impact the facility (e.g. incline cracks precipitating an uncontrollable blowout and severing pipes).

5.6 Aesthetic Issues

5.6.1 Noise

Noise is primarily considered a Health and Safety Issue, Section 5.7.3, but also affects the aesthetics of an area. It might also affect life style (Section 5.9.2).

Commenters want the EIS to address the impacts of noise associated with geothermal development, including drilling, operation and venting and transmission lines. They note that noise is a nuisance, disrupting peace and quiet.

5.6.2 Visual Issues

The EIS should address the visual impacts of the transmission lines.

5.6.3 Odor Issues

The EIS should address the effect of the odor that permeates regions with geothermal developments.

5.7 Health and Safety Issues

Nearly all commenters (94%) expressed some health and safety concerns, several noting that to protect public health and safety is the duty of the government. Many mentioned effects of geothermal emissions, the effects of emf around transmission lines, noise associated with either geothermal processes or the transmission lines (Sections 5.7.1, 5.7.2, or 5.7.3), and the need for an emergency response plan (Section 5.7.5) or psychological effects (Section 5.7.4).

5.7.1 *Geothermal Emissions and Effluents*

More than 60% of the commenters expressed concerns about the health and safety issues regarding the impacts of geothermal emissions on their air quality, their drinking water in catchment systems, and on foodstuffs. The commenters noted that Goddard and Goddard noted various health effects associated with geothermal emissions, notably H₂S, including eye and throat irritation, noise irritation, trouble breathing, coughing, and wheezing. Commenters asked why venting had been allowed (Section 5.8), particularly in a residential community (also Section 5.1).

- The EIS should address concerns about the short- and long-term health and safety impacts, both chronic, low-level and high-level doses of H₂S, Pb, CO₂, and other contaminants found in geothermal emissions, particularly on infants, children, the infirm and workers. The EIS should require studies documenting incidence of health effects coincident with geothermal development.
 - Several commenters report that they (or their children) have developed lung disease, lowered resistance to pneumonia, headaches, hair loss, nose bleeds, rashes during the HGP(A) experience; they have experienced similar problems during the recent PGV incidents.
 - During 12 June 1991 event, several workers were sent home as they were ill from exposure.
 - One commenter noted that the State's permitting policy gives limits in terms of releases averaged over 60 min. The commenter noted that this is questionable as 10-min exposures to high levels of H₂S can be lethal.
- A commenter reported that during the 12 June 1991 incident, CO₂ readings were highly unusual at the Volcanoes National Park. The commenter asked if there was sufficient O₂ in the air for safety [ref. children, infirm, elderly]. Could such an incident occur with HGP?

5.7.2 *Transmission Line Effects*

The EIS should investigate impacts associated with electromagnetic fields generated by the transmission lines. Several commenters were concerned about the impacts of transmission line failure (Sections 2.3 and 5.7.5).

5.7.3 *Noise*

The commenters want the EIS to address the impacts of noise associated with geothermal development. One commenter noted that current permitted levels (45 dB) are sufficient to disturb sleep in residences in the

surrounding community (Ref. to noise associated with SOH-4).

5.7.4 Psychological Impacts

More than 30% of the commenters mentioned psychological impacts. The commenters believe that the EIS should:

- address the psychological effects of geothermal development under normal and incident conditions of drilling, construction and operation, including fear, irritation, lack of sleep and frustration.
 - One commenter noted that the prior and on-going geothermal development has been a source of irritation since its inception.
 - Residents have been forced to leave homes, some during incidents, others permanently, and therefore live in constant fear and cannot sleep.
- consider the psychological effects of massive development on children (*i.e.* noting loss of their ecosystem).

5.7.5 Safety, Civil Defense Issues

With respect to the problems of geothermal development in a residential area, the commenters strongly urged that the EIS consider the following civil defense issues. These are also health and safety concerns (Section 5.7).

- The EIS should define an evacuation plan, based on worst-case scenarios. The commenter noted that the status of the current emergency response plan is confused:
 - The recently submitted emergency response plan was not considered acceptable by the local civil defense official.
 - 12 possible routes were suggested, but it was not clear how citizens would know which route to use.
 - Communication systems are not currently adequate. A commenter noted that everyone in the Puna District will be calling the same phone line. The commenter noted under the current system:
 - * When there was a murder recently, fire department and police could not adequately communicate, *i.e.* the system now is not functional.
 - * The phone recording with information is always out-of-date; the commenter suggests frequent [as needed] updating with information containing the evacuation plan to be used; toxic levels of operative constituents [the speaker said H₂S]; who should evacuate *etc.*

- The EIS should define an evacuation plan that considers the meteorology of Puna.
- Given the requirement in the recently submitted emergency-response plan and the prior experience with PGV (their lack of notification of civil defense authorities of the need for residents to evacuate), the EIS should explain how residents will be assured that notification will occur in an appropriately timely fashion. Commenter noted:
 - Reports that on 12 June 1991 by 6:45 PM, several residents were overcome with H₂S fumes; by 11:15 PM residents saw red light in the sky (like flames) and evacuated themselves. PGV called for an evacuation at 1 AM on 13 June 1991.
- Based on a worst case scenario for failures of the HGP, the EIS should identify the number of gas masks, quantity of O₂, blankets, clothing, food *etc.* required. It should identify transport for infirm, disabled, and those without transportation (identified depending on time of day).
- The EIS should identify who would pay for emergency response equipment required.
- The EIS should address the concern that there is no evacuation route, if, for some reason the road to Kea'au is out (*e.g.* power lines down), noting that Pahoa school children would be trapped [also Section 2.5, (The stacked transmission lines along the Kea'au road makes the system vulnerable)].

The EIS should address the impacts of the violence that is likely to occur should the HGP proceed.

5.8 Political Issues

A majority of presenters (~65%) expressed political concerns of one kind or another. These included comments suggest a lack of concern by government, loss of due process because of government regulations (*e.g.* Administrative Rule 12, Hawai'i Revised Statutes), loss of faith and trust in government, lack of enforcement of rules and regulations (including permitting and monitoring requirements) by government, and lack of necessary expertise within government.

The EIS should clearly delineate the federal and State's participation in the HGP.

5.9 Socioeconomic Issues

The EIS should address the social impacts of geothermal development.

5.9.1 *Economic Issues*

The EIS should determine the economic viability of the HGP and should address the economic impacts of geothermal development, particularly on residents of the Puna District. These impacts include:

- loss of livestock due to geothermal emission or effluents.
- the impacts of geothermal emissions on structures such as fences, houses, and water catchment systems, noting more rapid corrosion than would be expected under normal conditions.
- lower property values due to geothermal development. Property values are down since geothermal development; how can landowners be compensated?

5.9.2 *Life Style*

The presenters want the EIS to address basic life style issues, the potential for geothermal development to have a negative impact on:

- the quiet, peaceful life style of all residents of the Puna district. One commenter noted the present on-going development has already disrupted his life style, he no longer can stand in his backyard and meditate as he constantly hears or smells the operations at PGV (also Section 5.6.3).

5.9.3 *Social Issues*

5.9.4 *Native Hawaiian Issues*

About 25% of the commenters expressed concern that the geothermal development will negatively impact Native Hawaiian culture. They want the EIS to address the concern that geothermal development will desecrate Kilauea, the embodiment of Tutu Pele.

5.9.5 *Impacts to Cultural Resources (Archeological/Historical Sites and Regions)*

6. COST BENEFIT ANALYSIS

The presenters would like the EIS to address the concern that those who will bear the greatest cost in terms of health and safety, economics, cultural resources, and environmental losses, will not be the ones to benefit. They would therefore like the EIS to establish what the benefits of the HGP are and who benefits. [Environmental and economic issues are largely mentioned in Section 5, above, so the following reflect questions regarding the

recipients of the benefits.] The commenters mentioned:

- foreign corporations,
- the state, which receives royalties for geothermal steam, and
- the developers. The EIS should explore their backgrounds.
 - Mentioned that stock prospectus suggested that a number of eastern firms were involved.

7. LEGAL ISSUES

ATTACHMENT A

FACILITATOR PRESENTATION

HAWAII SCOPING MEETINGS

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Summary of Presentation

Introduction: Ms. Letts first introduced herself and Mr. Spiegel, from the Center for Alternative Dispute Resolution and West Hawai'i Mediation Services respectively, as professional facilitators. She explained that they were hired to run a fair and impartial scoping meeting. She then introduced Dr. Lewis [Hawai'i Geothermal Project (HGP) Environmental Impact Statement (EIS) Program Director from DOE Headquarters], Carol Borgstrom, Director of the Office of National Environmental Policy Act Oversight, DOE Headquarters], and William Dennison [Assistant General Counsel for the Environment, DOE Headquarters]. The facilitator then stated that her purpose was to remain neutral and keep the meeting on track.

Structure of Meeting: The attendees were advised as follows. The intent of the meeting was to identify issues and concerns that those present had concerning the HGP. The facilitators will do their best to assure that everyone has a fair and equal opportunity to be heard. In order to assure this, those who wish to speak will give their presentation in the order that they have registered; individuals will have 5 minutes and organizations and elected officials will have 10 minutes. Only questions with regard to process will be answered. Speakers are to identify themselves and the group they represent. Those who wish to speak should register; speakers may speak at only one of the planned scoping meetings; if anyone needs more time to finish, he/she may reregister, and time-permitting, will be given an additional 5/10 minutes, as appropriate. If a presentation is to be given in Hawaiian, an interpreter is available. If necessary, time for the meeting will be extended as possible. In each meeting there will be a 10 minute break about half way through the meeting. Any written materials can be handed in at the meetings or sent to Dr. Lewis at DOE before 15 April 1992 to assure consideration. Each meeting will be recorded by a court reporter, and tape and video recorders to assure an accurate record of presentations. If requested, the video recorder can be turned off. Transcripts of the meetings will be available in 21 reading rooms in Hawai'i and on the mainland. Attendees were invited to have their names placed on the EIS mailing list (sign up at registration desk) to receive any future EIS-related notices.

Ground Rules: The facilitator requests that those present be courteous to each other, that they do not interrupt speakers, and that they stay within the designated time limits. Private conversations and interviews should be conducted outside the meeting room. Dr. Lewis is available for interviews prior to each meeting and at the

breaks.

NEPA Background: The scoping meetings were shown to occur between the Notice of Intent (NOI) and the production of the EIS Implementation Plan (IP). Following preparation of the IP, a Draft EIS (DEIS) will be prepared. After public review of the DEIS, a FEIS is available for public review. A total of ten scoping meetings would be held with two each day in Pahoa, Wailuku, Kaunakakai, Honolulu, and Waimea (afternoon, 2-5:30 PM and evening 7-10:30 PM).

Turns meeting over to Dr. Lewis for further comment.

ATTACHMENT B

DOE PROJECT/PROCESS DESCRIPTION

HAWAII SCOPING MEETINGS

March 7, 1992, Pahoa, Hawai'i
March 9, 1992, Wailuku, Maui
March 12, 1992, Kaunakakai, Moloka'i
March 14, 1992, Honolulu, Oahu
March 16, 1992, Waimea, Hawai'i

Summary of Presentation

Introduction: After introducing himself as the Program Director for the Hawaii Geothermal Project Environmental Impact Statement (HGP EIS), Dr. Lewis began his presentation by stating that DOE's mission is "to prepare an Environmental Impact Statement (EIS) for phases 3 and 4 of the Hawaii Geothermal Project (HGP) as defined by the State of Hawaii in its proposal to Congress in 1989," noting that the Proposed Action had been defined by Congress (3/91) and the US District Court in Hawaii (6/91). He then explained that phases 1 [exploration, HGP(A)] and 2 [test of the feasibility of laying and retrieving the submarine cable] were complete. He noted that they were funded by DOE, Hawai'i, and others and had undergone NEPA review. He stated that although phases 1 and 2 had had environmental review, they form an important data base and would be reexamined from the perspective of cumulative impacts. He also noted that the EIS would examine a range of alternatives.

He then acknowledged Carol Borgstrom, Director of the Office of National Environmental Policy Act Oversight, DOE Headquarters], noting that she was assisted by Dr. Yvonne Weber, and also William Dennison [Assistant General Counsel for the Environment, DOE Headquarters], recognizing his assistance by Janine Sweeney. He then introduced the representatives from DOE-OR (Andrea Campbell); ORNL, assisting in the preparation of the EIS (Dr. Amy Wolfe, Dr. Virginia Tolbert), and LBL, cable and alternatives (Mary Hunt). The latter were also to assist in recording highlights of scoping meetings.

EIS Process: Dr. Lewis described the EIS process. Initially an ANOI was published; 55 letters and hundreds of comments were received in response. Next, were information exchange meetings with various civic, environmental, and Native Hawaiian groups, utilities, museums, developers, and potential cooperating agencies, including several federal, state, and county departments. At these meetings, concerns and issues were raised. He noted that several agencies would probably elect cooperating agency status. Cooperating agencies can include federal agencies, state, county governments.

Dr. Lewis then turned the meeting over to the Facilitator for process questions.