CALPINE

FOURMILE HILL GEOTHERMAL DEVELOPMENT PROJECT

Environmental Impact Statement
Environmental Impact Report

Volume IV: Final EIS/EIR Comments on the Draft EIS/EIR

State Clearinghouse No. 96062042

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FOREST SERVICE
U.S.
DEPARTMENT OF AGRICULTURE

County of Siskiyou
AIR POLLUTION CONTROL DISTRICT

BONNEVILLE
POWER ADMINISTRATION

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September 1998

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Bureau of Land Management
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Alturas, California 96101

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Final EIS/EIR
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EXECUTIVE SUMMARY

The Executive Summary includes a description of the purpose and need for the proposed project and alternatives, a summary of key issues raised by the public during the comment period, and a summary of the environmental impacts of the proposed project.

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1: Introduction and Purpose and Need
2: Alternatives, Including the Proposed Project
3: Description of the Affected Environment
4: Environmental Consequences and Mitigation Measures
5: Mitigation Monitoring and Reporting Program
6: List of Preparers and Agencies and Persons Contacted
7: References
8: Index

Volume I of the Final EIS/EIR includes the revised text of the Draft EIS/EIR. The revisions to the document include errata, staff-initiated changes, and additional clarifications, as identified in the responses to public comments.

VOLUME II: FINAL EIS/EIR APPENDICES

A: Mailing List for Draft and Final EIS/EIR
B: Scoping Materials
C: Biological Resources
D: Visual Resources
E: Meteorological Data
F: Air Quality Impact Assessment

Volume II includes the appendices that were included in the Draft EIS/EIR. The appendices have been provided as a separate volume due to the increased size of the EIS/EIR. Similar to Volume I, Volume II reflects revisions due to errata, staff-initiated changes, and additional clarifications.

VOLUME III: FINAL EIS/EIR RESPONSES TO COMMENTS ON THE DRAFT EIS/EIR

1: Introduction
2: Agencies, Organizations, and Persons Commenting on the Draft EIS/EIR
3: Responses to Comments on the Draft EIS/EIR
4: Responses to NEPA/CEQA Issues Comments
5: Responses to Project Preference Comments
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Volume III presents all public comments on the Draft EIS/EIR as well as comments on other issues, and the agency responses to all of these comments. Public comments were submitted in writing, and heard verbally at public hearings that were held for the Draft EIS/EIR. Individual comments have been organized by parameter in order to provide complete response on all issues.

VOLUME IV: FINAL EIS/EIR COMMENTS ON THE DRAFT EIS/EIR

1: Original Comment Letters
2: Comment Index

Volume IV provides copies of the original comment letters that were received on the Draft EIS/EIR. This volume also includes copies of the transcripts from the Draft EIS/EIR public hearings.

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1: ORIGINAL COMMENT LETTERS

Letter A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 16, 1997

Mr. Randal Sharp, USFS
EIS Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the **Fourmile Hill Geothermal Development Project, Siskiyou and Modoc Counties, California**. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act.

The DEIS analyzes the impacts of proposed geothermal project alternatives which include development activities, construction of a 49.9 megawatt (MW) power plant and ancillary facilities, and the construction of a 24-mile 230-kilovolt (kV) transmission line that ties into an existing power grid. Seven alternatives are provided. Alternative 1 is the proposed action and includes a power plant, well field and a proposed transmission line. Alternatives 2 through 6 describe various alternate routing segments for the proposed transmission line. In our review we noted that there are no true alternatives to the proposed action, except for alternative 7, which is the no-action alternative. A.1

Although parts of the DEIS are well written and complete, we do have substantial environmental objections and concerns. Pursuant to EPA's *Policy and Procedures for the Review of Federal Actions Impacting the Environment*, we have rated each of the alternatives listed in the DEIS because a preferred alternative has not been identified. (See the enclosed "Summary of Rating Definitions and Follow-up Action"). Alternatives 1 through 6 are all rated EO-2 and alternative 7 is rated LO. Our rating assumes that all alternative transmission line segments include construction of the power plant and well field because construction of transmission lines without the power generation facilities would not serve the project's purpose and need. A.2

The EO-2 rating, Environmental Objections - Insufficient Information, is based on the intensity of potential significant environmental impacts to water, air, and cultural resources and the degree to which the proposed action may establish a precedent for future actions with significant effects [40 CFR 1508.27(b)].

With regard to impacts from the powerplant/wellfield, our objections are based on insufficient A.3

information or mitigation measures in the DEIS that would assure less than significant impacts to the shallow groundwater system, springs, lakes, water supplies and wildlife./Our objections also incorporate issues raised by the proposed construction of at least one additional geothermal powerplant/wellfield (Telephone Flat), including the uncertainty of actual life of operations for either proposed project, and associated cumulative impacts. EPA views these two actions as similar actions in keeping with 40 CFR 1508.25(a)(3). Accordingly, we suggest that they be addressed in a single EIS. An Agency, according to 1508.25, should do so "...when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives ... is to treat them in a single impact statement."

Similarly CEQ's *Forty Most Asked Questions* (24b) encourages area-wide or overview EISs "... when similar actions, viewed with other reasonably foreseeable or proposed agency actions, share common timing or geography. For example when a variety of energy projects may be located in a single watershed..." EPA also references comments made by California Energy Company (comment letter dated December 4, 1996 addressing the Fourmile Hill Area Geothermal Exploration Project EA), proponents of the Telephone Flat project, which strongly endorsed combining environmental documents for "complete evaluation of environmental consequences." A.4

Our objections to the selected transmission line routes described under alternatives 1 through 4 reflect possible significant impacts to wetlands, water quality and visual resources. A.5

We commend the lead agencies for including sections on traditional cultural values and initiating government-to-government relations with affected Indian tribes, whom have stated their opposition to the project. We encourage a continued dialog to resolve tribal issues and search for acceptable mitigation measures. EPA reminds the USFS/BLM that lack of resolution regarding our environmental objections in the FEIS could create additional concerns for the affected tribes. A.6

We appreciate the opportunity to review this DEIS and request that we meet to discuss our objections and concerns, as provided in the comment letter, prior to release of the FEIS. We kindly request that two copies of the FEIS be sent to this office when it is officially filed with our Washington, D.C., office. To schedule a meeting, or if you should have questions, please contact David Farrel, Chief, Federal Activities Office, or Karl Kanbergs at (415) 744-1483. A.7

Sincerely,

Deanna M. Wieman, Deputy Director
Cross-Media Division

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

Similar Actions

The EPA views the proposed action and the planned Telephone Flat project as similar actions. 40 CFR 1508.25(a)(3) encourages agencies to consider addressing similar actions in the same EIS. Although USFS/BLM have indicated that the two actions should not be considered together because of their location and geologic/hydrologic settings, we believe the DEIS does not provide sufficient information or assurances that water resources and biologic resources would not be affected by long-term cumulative impacts from both projects. A.8

The proposed action would be located just outside of the Medicine Lake Caldera, whereas the Telephone Flat project would be within the Caldera Complex. Based on the schematic cross section of the Medicine Lake Highlands (Figure 3.4-2), we contend that both projects are part of a large, regional geothermal system. While shallow groundwater may flow northward from Fourmile Hill, the geothermal reservoir for both projects appears to be connected. The DEIS gives insufficient information to provide reasonable assurance that there would not be fracture communication between the deep and shallow systems. EPA is concerned regarding possible recharge of the geothermal system by depletion of the shallow system, and the possibility of fresh water contamination by thermal waters. A.9

We believe that the projects are also similar because they rely on the same transmission line system. The projects would likely produce similar kinds of visual, air, and noise impacts. We believe that, cumulatively, several geothermal operations in the Medicine Lake Highlands could produce significant environmental impacts on traditional cultural uses and recreational uses. These cumulative impacts should be further examined in the FEIS. A.10

Additional Power Generation Alternatives

In light of the significance of potential impacts associated with the Proposed Action, the FEIS should include a discussion of alternate well and plant sites. At Page 2-3, the DEIS cites the California Environmental Quality Act (CEQA) Guidelines, Section 1526(d)(5), to justify the exclusion of alternate well field and power plant site alternatives. This section states that EIRs must include only those alternatives necessary to permit a reasoned choice. However, EPA notes that the same section states that the "key issue is whether the selection and discussion of alternatives fosters informed decision-making and informed public participation." This statement is consistent with NEPA requirements which require that an agency evaluate all reasonable alternatives [40 CFR 1502.14]. A.11

Due to the controversial nature of the project, we suggest that alternate locations and alternate power generation scenarios be discussed. The best estimated commercial potential from A.12

other known KGRAs (Known Geothermal Resource Areas) should be discussed. Additionally, alternatives to geothermal generation, such as wind power or a combination of geothermal and an alternative energy source, should be included in the discussion.

Alternative Transmission Line Segments

EPA states particular objection to the transmission line routes described under alternatives 1 through 4 because they include segment A1, which would traverse a sensitive environmental area. Selection of the segment A1 alignment could create significant visual and biologic/ecologic impacts, and could have a significant effect on potential tribal use of sacred/traditional sites. Furthermore, the A1 segment may cross a seasonal wetland. Under Executive Order 11990 (Protection of Wetlands, 1977), "Each agency shall avoid undertaking or assisting in wetland construction projects, unless the head of the agency determines that there is no practicable alternative to such construction...." A.13 A.14

According to the DEIS (pg. 2-59), all of the transmission line alternatives are considered to be technically feasible and reasonable from a cost perspective. EPA recommends that USFS and BLM select a transmission line route which avoids the A1 segment. A.15

Alternatives 5 and 6 avoid the heart of the Medicine Lake recreational area and would avoid the intensity of environmental and cultural impacts that alternatives 1- 4 pose. EPA has concerns that wetlands could be affected (particularly for segments C1 or C2), and is also concerned about possible impacts to roadless areas, sacred/traditional sites, impacts on biologic resources, visual/socioeconomic impacts to the community of Tionesta (along segment C1), and visual impacts to views from the Lava Beds National Monument (segments A3 and B1). A.16

The Forest Service should consult with appropriate agencies, including the U. S. Army Corps of Engineers, regarding the applicability of Section 404 of the Clean Water Act. The FEIS should include proposed mitigation measures to compensate for significant environmental impacts, including potential wetlands impacts. A.17

In considering the placement of an additional power line near the community of Tionesta, the DEIS should not dismiss potential socioeconomic or cumulative impacts of this proposed action just because there are five existing transmission line corridors (pg. 4-301). A.18

WATER RESOURCES/HYDROGEOLOGY

General Issues

Due to insufficient information, the EPA is left with questions about the potential for depletion or contamination of the shallow aquifer by geothermal fluids during the life of A.19

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

002866/97-193

Enclosures

cc: Rich Burns, Bureau of Land Management
Diane Henderson-Bramlette, Modoc National Forest, U.S. Forest Service
Barbara Holder, Klamath National Forest, U.S. Forest Service
Patrick Griffin, Siskiyou County Air Pollution Control District
Kathy Fisher, Bonneville Power Administration

commercial production of geothermal power, and the possibility of creating surface geothermal hazards. A combination of such events could jeopardize public health or safety, recreation opportunities, or possibly prohibit access to Indian sacred sites (Executive Order 13007).

The DEIS presents very general geologic, hydrogeologic, and thermal information and vaguely documented statements that suggest a low probability for the occurrence of the previously described events. Provided information suggests that a thick unfractured and impermeable geologic formation separates the cold water system from the fresh water system. Aside from one documented surface hot spot, all other included information in the DEIS indicates that the shallow groundwater and springs/lakes are presently unaffected by the underlying geothermal activity. A.20

The FEIS should address, in more detail, the potential for geothermal operations to modify the existing groundwater flow regime, especially in light of induced seismicity. Furthermore, the geothermal system relies on fracture permeability. The potential for fracture permeability to accommodate communication between the thermal reservoir and overlying fresh water system, and possible resulting contamination and/or fresh water depletion, should be further discussed in the FEIS, and supported by field data. Plans to obtain and evaluate this information, if not presently available, should be provided. A.21

According to the DEIS the proposed project will inject spent geothermal fluids back into the formation. The project proponent would be responsible for geothermal reservoir pressure and chemical characteristic monitoring. While groundwater injection is a recognized standard procedure, it involves the potential for creation of geologic hazards, alteration of flow regimes, etc. The FEIS should discuss the potential for the proposed action to create such problems--and provide assurances that potential structures that could accommodate fluid flow into the overlying fresh water aquifer will be avoided and/or mitigated. A.22

Water Quality

EPA is concerned about the potential for contamination of the shallow aquifer by geothermal fluids during the life of commercial production of geothermal power. A.23 The FEIS should provide and/or assure that sufficient baseline information regarding water resources is collected prior to initiation of commercial geothermal operations so that the proposed and recommended monitoring and mitigation measures are effective. We recommend a complete baseline study of potentially affected surface and groundwater resources. This should include geochemical sampling and collections of various parameters, including isotope analysis and gasses. A.24 Please note that when looking at the proposed project from the Underground Injection Control Program (UIC) regulatory point of view, this DEIS is insufficient in noting (even in general terminology) that the proper measures will be considered and implemented. A.25

EPA commends the USFS and BLM on the inclusion of the section "Effects of Air Emissions on Water Quality." However, EPA believes that a complete geochemical analysis of Medicine Lake water is required to make this section credible. In keeping with 40 CFR 1502.22 we recommend that this information be provided in the FEIS A.26

Page 2- 29 of the DEIS lists ammonia as a constituent of cooling tower drift. During the early operations at the Geysers, steam condensate containing ammonia was discharged to streams, and it was determined that the ammonia was responsible for fish kills. The FEIS should discuss the possibility of ammonia emissions in the steam condensing and affecting local water bodies, in particular during inversion conditions that could be encountered during the winter months. A.27

The EPA recommends that the FEIS consider, in more detail, the combined impacts and potential direct, indirect, and cumulative impacts of both the Proposed Action and the possible Telephone Flat project on the hydrogeology, hydrology and water quality of the affected environment. A pooling of resources and possible groundwater modeling should be considered. A.28

System Hydrology

The DEIS describes the affected environment's hydrology. Clearly, the hydrogeologic environment is complex. Medicine lake is reported to be fed by "emergent springs" (pg. 3-20). Five other springs are located within five miles of the proposed power plant site. These springs should be cross-referenced with spring locations shown on Figure 3.3-3. A.29 This figure and Figure 3.3-4 show that the shallow groundwater table is "mounded" (i.e. has a higher elevation) in the general project area, and the regional groundwater flow direction is radially outward from this mounded region in all directions. The implications of this configuration is not explained in the DEIS, but should be addressed in the FEIS. A.30

EPA is concerned with possible lowering of the shallow water table and effects on springs and lakes, including the Fall River springs, if some recharge occurs to the geothermal system via fractures in vicinity of the Medicine Lake Caldera. The DEIS implies that the Medicine Lake Highlands is an area of groundwater recharge. The mounded character of the water table supports this position. However, the DEIS has strong statements that imply no recharge to the geothermal system from the overlying, shallow, fresh water aquifer system. This is poorly substantiated by the data provided. The FEIS should include additional scientific support for the proposed conceptual geothermal/hydrogeologic model. A.31

The information provided suggests that groundwater upwelling is quite possible. The DEIS states that Medicine Lake is fed in part by springs. Upwelling could include the hot water system, even if thermal or chemical signatures are very subtle at the surface. We note evidence of thermal/freshwater connections based on collected data by Rose and Davisson (1996) at the Fall River springs. Section 3.4-2 indicates that the deep water system flows in toward the A.32

Medicine Lake Caldera. What assurances are there that the project and/or projects would not perturb the hydrogeologic system? Are there additional "ring fracture" faults in the area of the proposed well field that could cause freshwater contamination as a result of operations? These questions should be addressed in the FEIS.

Hydrologic Monitoring

A hydrologic and geochemical monitoring plan has been proposed by the U.S. Geological Survey for the Glass Mountain KGRA (pg 3-27). The EPA would welcome such a comprehensive monitoring plan and strongly recommends that this kind of plan be incorporated into the proposed hydrology mitigation, monitoring, and reporting program as described on pages 5-4 and 5-5. Specifically, we feel that water quality monitoring (and collection of parameters to gage possible geothermal effects) of lakes and springs and discharge measurements from springs and the noted hot spot, serve a concrete purpose in ensuring that the cold water system is not being adversely affected. The monitoring of water supplies at Fall River (pg. 3-26) should also be part of the program. This particular monitoring program, because it involves drinking water, an existing hydroelectric facility, and an endangered species (Shasta Crayfish), should reflect a thorough understanding of source area, and proper placement of monitoring stations or wells. As aptly stated by Geonomics (1978): A.33

> Withdrawal of geothermal fluids may alter deep ground water flow patterns, and perhaps even the surface flow rate. . . . Any attempt to assess these effects now, and the effect of fluid reinjection, is speculative. It will require several years of continuous monitoring activity, superimposed on the known background [values] to understand the possible withdrawal and reinjection effects.

The EPA believes that the proposed and recommended monitoring efforts and baseline studies are key in reducing environmental impacts to water resources. We suggest use of monitoring protocol such as the protocol described in *Groundwater Monitoring Guidelines for Geothermal Development* (Weiss, et. al., 1979). Specifically, monitoring of production and injection wells should be done at least to the standards of the Underground Injection Control Program (UIC) regulations. The construction and inspection of injection and production wells should incorporate best available demonstrated control technology. The DEIS does not provide A.34 sufficient information regarding the construction, operation and closure of the injection wells in the project area. These items need to be addressed in the FEIS. The FEIS should also mention compliance with the applicable regulations pertaining to the Underground Injection Control A.35 Program of the Safe Drinking Water Act.

Additional Data

Under 40 CFR 1502.24, "agencies shall insure ... scientific integrity ... in environmental impact statements" and provide accurate scientific analysis [40 CFR 1500.1(b)]. Additional detail should be provided in the FEIS on geochemical analysis from springs and lakes, and more detail is A.36 required in the form of a geologic and structural map of the specific project area to assess potential shallow groundwater contamination/depletion or creation of thermally related surface geologic hazards. Page 3-15 of the DEIS states that no detailed analysis of lake water chemistries that include concentrations of metals and organic compounds are available. The EPA feels that specific water quality analysis of constituents potentially related to thermal waters should be A.37 collected and discussed in the FEIS. We cite 40 CFR at 1502.22 that provides guidance to agencies regarding incomplete or unavailable information.

We consider the Regional Geologic Map, Figure 3.2-1 lacking sufficient detail. At the level of detail provided the northeast trending fault, as depicted, could affect the project area. Is this a fault zone, and what is the nature of this structure? With regard to the geologic characterization, the DEIS' description of a long exploration history would suggest that additional geologic and geophysical data may be available. For instance, a thick and clay-rich "impermeable" A.38 zone separating the hot and cold water is noted but poorly documented. Could the clayey character be only a local feature, and could this formation contain areas with a non-clayey and fractured character, capable of transmitting water? A detailed resistivity survey over the well field site could identify fault zones within the confining unit that should be avoided.

While incorporation by reference [40 CFR 1502.21] is sometimes preferable in an EIS, we feel that in certain cases inclusion of key tables, figures, or an appendix is the better choice. For instance, Pg. 3-39 (Table 3.4-1) provides a partial analysis of geothermal fluids and cites to reference for additional data. However, after inspection of this reference (Fourmile Hill EA/IS, BLM et. al., 1995) this data was not found . Table 3.4-1 should contain complete geochemical A.39 analysis of geothermal fluids (liquids and gasses) encountered to date, including potential contaminants such as arsenic, boron, hydrogen sulfide or radionuclides. We recommend inclusion in the FEIS of a clear and concise table that should list the concentration of all typical geothermal fluids. A comparative analysis should also be included of typical shallow ground water and surface waters.

CUMULATIVE IMPACTS

EPA has serious reservations regarding cumulative impacts which could result from a second proposed geothermal operation (Telephone Flat). Under CFR 1508.27(b)(6), the intensity A.40 of an impact is defined in the context of effects of the proposed action on future actions and setting of precedent.

According to the DEIS, extension of the project life span past the projected 45-year duration is not considered reasonably foreseeable, even though the Glass Mountain KGRA was initially calculated to have the potential to produce an estimated 550 MW of electric power (DEIS pg. 2-38). EPA questions this assumption, since the life of the Proposed Action could be extended based on actual conditions encountered, energy prices, and evolving technologies. We cite the history of the Geysers field, California, which started out as a 10 MW producer and currently is producing more than 1000 MW with over 250 production/injection wells in place.

At Page 4-311 the DEIS indicates that if any portion of the project were to exceed the 45-year time line, it would be subject to "additional environmental review and documentation." Nevertheless, EPA recommends that the EIS include a discussion of cumulative impacts associated with the possibility that the project's operational life could exceed 45 years, based on the original estimate of geothermal potential. This discussion should focus on cumulative impacts to surface and groundwater quality and cumulative impacts to biologic resources and human health. A.41

Cumulative impacts are of particular concern in addressing the objections to the project by northeast California Indian tribes. For instance, what would be the possible effects on tribal culture if the operating life of the commercial facilities was significantly extended? A.42

According to the DEIS (pg 1-13), at least 28 geothermal exploration drill tests have been completed by various companies in the Glass Mountain KGRA since 1982. The current status of these wells along with information to their manner of closure should be discussed in the FEIS. The status of these "abandoned" wells must be evaluated prior to granting of permits for further well construction. Additional information should be provided on the cumulative impacts from these past activities. The information should include discussion of visual impacts, history of any upset conditions, a statement on any possible impairment to the local water supply or surface water quality, and results of reclamation activities, where applicable, according to BLM, Forest Service, California Division of Oil, Gas and Geothermal, or EPA regulations. Also, if any drill hole is identified within the "Area of Review" of an injection well as per 40 CFR 146.6 it shall be abandoned according to proper regulations, so that the injected waters pose no threat to potable water aquifers. A.43

The DEIS notes a projected net loss of fluids from operations totaling 475,000 pounds per hour. Assuming standard temperature and pressure conditions, this would equate to about 1500 acre feet per year. The cumulative impact analysis should describe any anticipated or potential significant environmental impacts to recharge areas of the geothermal system with regard to water or biologic resources. Both geothermal projects should be included in the analysis. The EPA finds the section on cumulative impacts -- hydrology (pg. 4-316), especially insufficient. The statement, "The geothermal reservoir is not believed to be connected to regional groundwater systems" is particularly troublesome and unsubstantiated. The only way that this would be A.44

possible is if the fluids come from connate brines. A source region for the geothermal system is not identified. The FEIS should show why the geothermal system could not be recharged from the Medicine Lake Highlands. According to studies by Lawrence Livermore Laboratories (Rose and Davisson, 1996 and Davisson, 1997), the Fall River springs have a magmatic CO_2 signature, suggesting a connection between geothermal and fresh waters. For further information, we defer to Lawrence Livermore Laboratories which has indicated that it wishes to provide its own comments to the DEIS.

AIR QUALITY

We commend the USFS and BLM for discussing the California and National Ambient Air Quality Standards (NAAQS). The DEIS notes that a PSD permit will not be required for the project because it is not considered a major source. Furthermore, according to the DEIS, concurrent production at the Telephone Flat geothermal operation is not anticipated to create an exceedence of NAAQS. In order to substantiate this statement, EPA recommends an inclusion of a table listing estimated average emissions of criteria pollutants for Telephone Flat, similar to the included table for the proposed action (Table 4.13-3). A.45

The FEIS should include an estimate of H_2S emissions at Telephone Flat, and a statement describing the expected differences, if any, in air emissions from the two projects. A.46

PSD increments exist for sulfur dioxide, total suspended particulates, and oxides of nitrogen. While the project area itself is not a Class 1 Area, a Class 1 Area Impact Analysis, to assess impacts to applicable surrounding areas, should be considered for the listed increments. A.47

According to the DEIS the cooling tower drift (dissolved and suspended particulates in water vapor) would emit at a rate of 448 pounds per hour. For purposes of full and fair discussion in NEPA documents [40 CFR 1502.1] the FEIS should break down the estimate of the drift emissions as percentages according to the mentioned constituents (pg. 2-29 of the DEIS). A.48

The FEIS should also identify atmospheric conditions which could exacerbate and/or intensify concentrations of hazardous air pollutants, and should relate these conditions to the activities under consideration. As an example, hydrogen sulfide (H_2S), a listed emission at the site, tends to collect in low-lying areas, a situation which could be intensified under certain meteorological conditions. The FEIS should identify areas prone to H_2S concentrations and should discuss the impacts and amplify on health risks related to the situation. A.49

SAFETY HAZARDS

Blowouts and Casing Rupture

According to the DEIS, risk of blowout is considered low due to anticipated formation conditions and planned preventative procedures. With regard to H_2S emissions associated with such an event, the FEIS should specifically include an emergency contingency plan to provide evacuation, if necessary, and emergency services. The FEIS should provide additional detail regarding monitoring, inspection and mitigation procedures to ensure the proper use of tools and equipment and that proper construction procedures are followed. For instance, the FEIS should describe what procedures and materials would be used in drilling, construction and closure of all wells to guard against corrosion and other anticipated hazards or difficulties encountered (e.g. use of low carbon steel). The FEIS should indicate if on-site inspection will be provided (as required in state, federal and local regulations) during drilling and construction operations to ensure that proper cementation techniques are used. In particular, the potential for casing rupture should be addressed in the FEIS. We cite an example of casing failure and contamination of shallow aquifers in the East Mesa geothermal field, located near El Centro, California (Estabrook, 1997). We also recommend that well site lithology and structure be considered in well site selection. A.50 A.51 A.52 A.53

Hazardous Materials

The Proposed Action includes the potential use of various hazardous materials as listed in Table 4.15-3 of the DEIS. We are particularly concerned regarding use of chlorine. The FEIS should identify whether the chlorine will be brought on site and stored in gas form. If that is the case, alternatives to chlorine gas may be available and are strongly recommended. We commend the USFS and BLM for inclusion of inspection provisions for safe housekeeping practices in storage and handling of all hazardous materials on site, and particularly encourage frequent inspections during summer months when a larger visitor base is nearby. In addition to surrounding berms, wherever practicable, stored hazardous materials should be placed on liners or cement pads to avoid infiltration into the ground in event of spillage. A.54 A.55

REQUIRED PERMITS AND APPROVALS

Segment A1 of alternatives 1 through 4 may pass through a wetland area. If so, a Section 404 permit under the Clean Water Act may be required. Section 404 regulates the discharge of dredge or fill material into waters of the United States, including wetlands and other "special aquatic sites." We recommend that the USFS and BLM consult with the U.S. Army Corps of Engineers regarding this matter. The applicability of this permit should be noted in Table 1.4-1. A.56

According to the DEIS, most Geothermal Facilities permits fall under jurisdiction of the BLM as listed in Table 1.4-1. The FEIS should state which permits apply to production wells and A.57

which apply to injection wells, and whether there is any involvement from the state of California, the California Regional Water Quality Control Board, the EPA, and local, tribal or county agencies. Applicability of any RCRA regulations to spent geothermal and/or cooling fluids and gray water should be discussed as well in the FEIS. A.58

Legal requirements governing construction, operation and closure of injection wells are documented in detail in UIC regulations at 40 CFR §§ 144, 146. The injection wells for the Proposed Action would be classified as Class V Geothermal injection wells. EPA has ultimate responsibility to ensure that the UIC regulations are being properly implemented, and would like to work with that lead agency. The FEIS should properly state the applicability of federal UIC regulations at a minimum. A.59

RECLAMATION AND FINANCIAL ASSURANCE

The FEIS should include a more detailed reclamation plan and note any applicable regulations. The EPA is particularly eager to see additional assurances in the FEIS that the geothermal drill holes will be abandoned properly, surface and subsurface pipelines and other equipment removed from the site and surface restoration completed to a pre-determined degree. The UIC regulations applicable to the injection wells require that financial assurance be provided. A.60

NOISE

The testing of geothermal wells prior to production can produce very loud noise of significant duration if proper silencing equipment is not used. The DEIS in various sections indicates that silencing equipment will be use during testing. The section on Noise (4.14) states that worst-case construction noise is incorporated into Table 4.14-4. It is unclear whether noise from testing is included. This should be specified in the FEIS. A.61

Additionally, we recommend that BLM/USFS review construction operations and well testing schedules to determine whether they may affect seasonal nesting and mating activities of sensitive species, and the public's enjoyment of the recreation experience. If impacts are anticipated, appropriate mitigation measures should be discussed in the FEIS. A.62

SOCIOECONOMICS

According to the DEIS, the Medicine Lake Highlands, exhibits a clear demographic trend of increased recreational use (section 3.11). An estimated 40,000 recreationalists visit the area each year (pg. 3-157). However, under "Socioeconomic Impacts," no significant (negative) impacts are noted from the proposed Fourmile Hill operations or the possible future operation at Telephone Flat. We feel that the concurrent operation and/or construction of two power plants, with related noise, steam plumes, visible night lights (Telephone Flat), and a possible backdrop of A.63

a transmission line to the north of Medicine Lake, could have a significant and long term negative impact on recreational use and tourism in the area. The project(s) therefore could have a negative influence on the economic base of Siskiyou and Modoc Counties if people choose to stay away because of the proposed commercial development. The FEIS should include a section describing potential negative socioeconomic impacts from the Proposed Action, and carefully document methodology and assumptions.

INDIAN SACRED SITES

The area of the Proposed Action is a documented sacred/ traditional area of northeast California tribes. EPA is concerned that the project could prohibit access to Indian sacred sites, in violation of Executive Order 13007, generally based on worst-case impacts as discussed in sections on water and air resources. To address this concern, we strongly urge incorporation of our various recommendations into the FEIS, especially the additional requested information and assurance for collection of baseline data, and recommended monitoring and mitigation measures. A.64

REFERENCES

Davisson, Lee, 1997. Personal Communication. Lawrence Livermore Laboratories, California.

Estabrook, Rich, 1997. Personal Communication. Bureau of Land Management, Ukiah, California.

Rose, Timothy and Lee Davisson, 1996. Isotope Hydrology of Voluminous Cold Springs in Fractured Rock From an Active Volcanic Region, Northeastern California. Journal of Hydrology, 179, pp. 207-236.

Geonomics, Inc., 1978. Geothermal Environmental Impact Assessment: Baseline Data for Four Geothermal Areas in the United States. EPA-600/7-78-188.

Weiss, Richard B., Theodora O. Coffey, and Tamara L. Williams, 1979. Geothermal Environmental Impact Assessment: Ground Water Monitoring Guidelines for Geothermal Development. EPA-600/7-79- 218.

Letter B

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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IN REPLY REFER TO:

1-11-96-I-39

September 30, 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development
Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Subject: Draft Environmental Impact Statement/Report, Fourmile Hill Geothermal Development Project, Siskiyou and Modoc Counties, California

Dear Mr. Sharp:

We have reviewed the Draft Environmental Impact Statement/Report for the proposed Fourmile Hill Geothermal Development Project (Draft EIS/EIR), located within the Glass Mountain Known Geothermal Resource Area (KGRA)on the Klamath and Modoc National Forests in Siskiyou and Modoc Counties. The project applicant, Calpine Corporation, proposes to construct, operate, and then decommission a 49.9 megawatt (MW) geothermal power plant with 5 production well pads; 3 injection well pads; associated pipelines; access roads; and a 24-mile long, 230-kilovolt transmission line and substation. Approximately 388.5 acres of habitat would be lost or disturbed as a result of construction of the project. The proposed project may affect biological resources for which the Fish and Wildlife Service (Service) has mandated responsibilities pursuant to the Endangered Species Act of 1973, as amended (Act). The following comments are provided to assist the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and Siskiyou and Modoc Counties in their review and assessment of project impacts.

GENERAL COMMENTS:

For the following reasons, the Service is concerned that the Draft EIS/EIR does not adequately address the effects of the proposed actions on federally listed species, migratory birds, and Federal species of concern:

1. Section 7 Consultation and the Prohibition Against Take

The draft document identifies two federally listed threatened species, the bald eagle (*Haliaeetus leucocephalus*) and northern spotted owl (*Strix occidentalis caurina*), that may be affected by the construction, operation, and decommissioning of the Fourmile Hill Geothermal Development Project. Section 7(a)(2) of the Act requires that any action authorized, funded, or carried out by a Federal agency will not jeopardize the continued existence of an endangered or threatened species. As a result, this B.1

section of the Act, and its implementing regulations, require Federal agencies to initiate formal consultation with the Service when a Federal action may affect a listed endangered or threatened species.

Section 9 of the Act prohibits the "take" of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such wildlife species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3). Take incidental to otherwise lawful activity may be authorized through the formal consultation process if a Federal agency is involved with the permitting, funding, or carrying out of the project. Initiation of formal consultation is required between that agency and the Service pursuant to section 7 of the Act if it is determined that the proposed project may affect a federally listed species. Federal agencies must confer if they determine that the continued existence of a proposed species may be jeopardized by the project. Such consultation or conference could result in a biological opinion that addresses anticipated effects of the project to listed and proposed species and may authorize a limited level of incidental take.

2. Effect on Regional Groundwater and the Shasta Crayfish

The Draft EIS/EIR does not consider the effects of the proposed action on the federally listed endangered Shasta crayfish (*Pacifastacus fortis*). This species is found in isolated populations in the middle reaches of the Pit River and its tributaries in Shasta County, including the Fall River. Because of the extremely limited range of this species and a number of other environmental factors that threaten its tenuous persistence, loss of only one of these populations may jeopardize the continued existence of the species. B.2

There is a conspicuous lack of scientific data in the draft document to describe the regional groundwater flow direction, either of the shallow cold groundwater aquifer or the underlying geothermal flow. Indeed, Figure 3.3-4 represents the estimated regional groundwater flow direction as a series of question marks. In addition, the draft document cites (page 3-26) a letter to your office from the Director of the Fall River Resource Conservation District, a geologist from the Colorado School of Mines, and a University of Michigan doctoral student, suggesting that there is a direct geohydrologic connection between the Medicine Lake Highlands, where this project and others are being proposed, and the headwater springs of the Fall River. We recommend that the draft EIS/EIR be revised to include a comprehensive description of existing scientific information and proposed scientific research regarding regional groundwater flow interconnections and the potential effects that removal or disturbance of such groundwater would have on federally listed aquatic species that inhabit the waters of the surrounding Mt. Dome/Klamath Lake, Tule Lake, and Fall River groundwater basins. B.3

3. Effects of Future Actions Proposed for the Glass Mountain KGRA

The 300 MW design capacity and 145 MW effective capacity of the transmission lines proposed for the proposed project are significantly greater than required to transfer electrical power from a 49.9 MW plant to the proposed substation, suggesting that other geothermal development projects are planned for the Glass Mountain KGRA. Indeed, on page 2-37, the Draft EIS/EIR, states: "...the USFS expressed a preference that the proposed transmission line for the project be designed to accommodate not only the net electrical power output of 44.9 MW from the proposed project, but also reasonably foreseeable geothermal B.4

power generation that could occur at the Glass Mountain KGRA." This information suggests that the proposed action may be interrelated or interdependent with other future actions. The section 7 implementing regulations require that Federal agencies consider the "...direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action...". Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

In addition, failure to analyze and disclose the potential environmental effects of such foreseeable future power development in the KGRA is inconsistent with the requirements of the National Environmental Policy Act of 1969, as amended (NEPA), to consider cumulative impacts of an action. As defined in the Council on Environmental Quality regulations for implementation of NEPA, cumulative impact is the "... impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The Service recommends that the draft EIS/EIR be revised to include a complete analysis and disclosure of the effects of future development of the Glass Mountain KGRA on federally listed endangered and threatened species and Federal species of concern. Federal species of concern are those species that may be endangered or threatened but for which enough biological information has not been gathered to support listing at this time.

4. Service Area Effects

The Draft EIS/EIR does not fully disclose the indirect effects to federally listed species of supplying additional electrical power to the Bonneville Power Administration and Pacific Northwest Power service areas. The draft document should be revised to analyze the effects to federally listed species, outside the immediate location of the proposed action, that result from future actions (residential or industrial construction, for example) made possible by the additional power supplied by the Fourmile Hill Geothermal Development Project. B.5

5. Fragmentation of Northern Spotted Owl Suitable Habitat

The Draft EIS/EIR does not discuss the effect of the proposed action on the ability of northern spotted owls to disperse in a north/south direction through the project area. In addition there is little discussion of the importance of the Medicine Lake Highlands Managed Late-Successional Area (MLSA) to the reserve network established in the Northwest Forest Plan for this and other late-successional forest species. We recommend that the Draft EIS/EIR be revised to include an analysis of the effects to northern spotted owls of additional fragmentation of suitable habitat. B.6

6. Medicine Lake Highlands Managed Late-Successional Area

Alternatives number three and four to the proposed action, incorporate transmission line segment B2, which crosses the Medicine Lake Highlands MLSA. According to the Record of Decision (ROD) for *Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* and *Standard and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Species within the Range of the Northern Spotted Owl*, the purpose of protecting B.7

MLSAs is similar to that of Late-Successional Reserves (LSR). The ROD specifies however, that certain silvicultural treatments and fire hazard reduction treatments may be permitted to help prevent complete stand destruction from large catastrophic events, such as fire. Alternatives three and four would remove habitat along a half mile of white fir-dominated forest and one-quarter mile of late seral stage forest in the MLSA. Since development of geothermal power is not one of the objectives of MLSAs, these alternatives are inconsistent with the ROD and should not be considered further. The Service recommends that the Draft EIS/EIR be revised to include other transmission line route alternatives that would be consistent with the ROD.

7. Potential Exposure to Contaminants

On page 3-37, the draft document states that no geothermal fluid samples have been obtained from the geothermal system in the Fourmile area and therefore, no water quality analysis of the groundwater underlying the proposed project is available. The Service is concerned that the open sumps proposed as part of the project action may contain water that is toxic to wildlife species. Foraging bald eagles may be attracted to the area if sumps or other collection basins attract and/or entrap waterbirds or other wildlife species. The presence of open water, if visible, in an otherwise arid landscape may draw these species to the project area and thereby expose them to potentially toxic material. No mitigation measures to reduce or avoid this injury to listed or other species is proposed as part of the project action.

Without any information on the potential water quality contained within the proposed sumps and absent any mitigation measures to protect migratory birds from exposure to contaminants, the Service must conclude that some take of migratory birds may occur over the life of the project. Because the Migratory Bird Treaty Acts prohibit take, we also recommend that the project applicant contact the Service's Law Enforcement Division at (541) 883-6900. B.8

In an August 27, 1997, letter to your office (enclosed), the Service's Klamath Falls Fish and Wildlife Office requested information on the potential exposure of listed species and migratory birds to contaminants as a result of another geothermal project that is proposed for the Glass Mountain KGRA. We recommend that the same type of information be developed for the Fourmile Hill Geothermal Development Project and that such information be incorporated into a revised Draft EIS/EIR for the subject project. In addition, we recommend that the project proponent develop a monitoring or contingency plan that includes provisions for suspension of operations if losses of fish or wildlife occur.

8. Surveys for Federally Listed Species

We recommend that the Draft EIS/EIR include a detailed description of the methods, timing, location, and results of surveys conducted for federally listed species. This information is important in the section 7 informal and formal consulting process to determine the effects of the proposed action on listed species and the types of mitigation measures that may be appropriate to minimize the potential impact of take. For example, it is not clear from the draft document if the proposed mitigation measures are adequate to minimize the impact of harm to or harassment of listed species as a result of nighttime illumination and noise disturbance due to project construction and operation, and/or noise disturbance due to increased traffic and other human activities. B.9

9. Surveys for Federal Species of Concern

Several plant and animal Federal species of concern may be affected by the proposed action. These include the: spotted bat (*Euderma maculatum*), Pacific fisher (*Martes pennanti pacifica*), small-footed myotis bat (*Myotis ciliolabrum*), long-legged myotis bat (*Myotis volans*), northern goshawk (*Accipiter gentilis*), rough sculpin (*Cottus asperrimus*), Egg Lake monkeyflower (*Mimulus pygmaeus*), and Columbia yellow cress (*Rorippa columbiae*). We recommend that project-specific surveys be conducted for all of these species that may be directly affected by project actions. We recommend that mitigation measures be developed to reduce or avoid direct and indirect project impacts to all of the species listed above. One of the benefits of considering Federal species of concern early in the planning process is that, by exploring alternatives, it may be possible to avoid conflicts that could develop, should a species of concern become listed before the project is complete. B.10

10. Bird Collisions with Transmission Lines

The Service is concerned about the statement on page 4-125, that bird collisions with large diameter conductors are relatively unlikely to occur. What diameter are the large conductors? The document does not cite any scientific literature or data that supports this claim. Potential mitigation measures are proposed for small diameter (3/8 inch) overhead ground wires and conductors. However, the Service is concerned that over most of the 24-mile transmission route, birds, including bald eagles, may not be protected from possible injury or death as a result of collision with conductors. B.11

11. Wetland Delineation

As part of the project action, Calpine Corporation proposes to avoid impacts to wetlands by routing the transmission lines around them. However, wetlands along the proposed transmission line routes have not yet been delineated. We recommend that wetland delineation take place as soon as possible to ensure that the proposed mitigation measures can be accomplished. B.12

12. Reclamation and Revegetation Plan

Because decommissioning of the power plant and associated facilities is proposed as part of the action, the Service recommends that a detailed reclamation and revegetation plan be incorporated in a revised Draft EIS/EIR. B.13

RECOMMENDATIONS:

Based on the above considerations, we have concluded that the proposed action constitutes a major construction activity which may affect three federally listed species. Therefore, we recommend that the USFS and BLM review their requirements for compliance with section 7 of the Act, and contact the Service regarding formal consultation requirements. We further recommend that consultation be completed prior to publication of the final environmental document that is prepared for development of the Glass Mountain KGRA. Thus, the Service recommends that the Draft EIS/EIR be revised to disclose and analyze all impacts of foreseeable future development for this area. B.14

In addition, we recommend that the project proponent, in consultation with this office and the California Department of Fish and Game, develop a more complete plan that mitigates for the project's direct and B.15

indirect impacts to federally listed species, migratory birds, and Federal species of concern and compensates for project-related loss of habitat. The mitigation plan should be included in a revised draft environmental document.

We request that this office be added to the mailing list found in Appendix A of the Draft EIS/EIR so that we will receive future documents as soon as they are made available. Please contact Nadine R. Kanim of my staff if you have questions regarding these comments. B.16

Sincerely,

Nadine R. Kanim

for Ronald A. Iverson
Project Leader

Enclosure

cc: ARD-ES, Portland, OR
ARD-FP, Olympia, WA
SFO, Field Supervisor, Sacramento, CA
CCFWO, Attn: L. Roberts
NCVFWO, Attn: K. Wolcott
KFFWO, Attn: B. Masinton
USFS, Goosenest RD, District Ranger, Macdoel, CA
CDFG, Regional Manager, Redding, CA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6610 Washburn Way
Klamath Falls, OR 97603

August 27, 1997

In Reply Refer To: 1-10-97-TA-082

Randall Sharp
USFS/BLM
Telephone Flat Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street

Dear Mr. Randall:

This responds to your letter dated May 20, 1997, and field review conducted on August 1, 1997, regarding the proposed Telephone Flat geothermal development project (Project) located on the Modoc National Forest (Forest) in Siskiyou County, California, approximately 1.5 miles east of Medicine Lake. The lead agencies include the Bureau of Land Management (BLM) for all geothermal activities and the Forest for National Forest lands. It is our understanding, this geothermal development is being proposed by California Energy General Corporation (CalEnergy) and involves Federal Geothermal Leases CA-12370, CA-12371, and CA-12372. The geothermal power plant is expected to produce 48 megawatts of electricity and would be transmitted through 230 kilovolt lines to the existing Bonneville Power Administration transmission lines 21 miles to the north and east (between Perez and Flurey Wells). The Project consists of the power plant, associated geothermal production and injection wells, well pads, sump ponds, roads, interconnected geothermal fluid pipelines, and the transmission lines.

The U.S. Fish and Wildlife Service (Service) has the following comments, concerns, and/or questions:

1) What effects could the Project have on bald eagles in the area in regards to foraging, nesting, and migration/flight patterns from construction and operations of the facilties? This should include, but is not limited to the following:

a) What are the flight patterns of eagles as they relate to transmission line placement (are eagle flight paths/transmission line placement such that collisions are unlikely)?

b) How will transmission lines be structured to prevent bald eagles from potential electrocution?

c) Waterfowl may view sump ponds as a potential loafing or foraging area. If these ponds contain hot water at the time these birds attempt to land, they may be

injured or killed. Injured or dead birds may lure bald eagles in which in turn may become injured or killed. Therefore, hazing, netting, or other methods may be necessary to prevent birds from entering the pond until water has cooled to safe levels (removal of the brine water may also be necessary depending on its toxicity/potential hazards to migratory birds and threatened and endangered species). How will sump ponds be constructed and/or managed to prevent waterfowl and bald eagles from entering?

2) What is the potential exposure from contaminants?

a) What hazardous materials will be used and/or stored within the area? What is the contingency plan in case of a spill (how will spills be handled)? How will storage, use, and spill response prevent impacts to threatened and endangered species, and migratory birds? **B.17**

b) What is the chemical composition of the geothermal brine water and is it consistent? What analysis will be performed (i.e. hydro-carbons, and ICP metals scan plus additional analysis for arsenic, selenium, and mercury) and how often will water be analyzed? What are the detection limits? What are the quality control and quality assurance procedures to be used to verify results? What will the capacity of the sump ponds be (should be at least 110% of maximum potential input to prevent overflow)? What are the potential impacts to threatened and endangered species, and migratory birds? **B.18**

c) How will waste waters, sludge, hazardous materials, and other wastes be handled to insure proper disposal? What discharges may occur and will they require a National Pollution Discharge Elimination System (NPDES) permit and/or a Regional Water Quality Control Board (RWQCB) permit? What discharges will be allowed under any NPDES and/or RWQCB permits and what restrictions will apply? How will storage, handling, and disposal prevent exposure to threatened and endangered species, and migratory birds? **B.19**

d) What will the chemical composition of air emissions from geothermal steam or other gaseous discharges be? What potential impacts to the surrounding area may occur including water quality, vegetation, invertebrate and vertebrate species, and micro-biotic community (acute/chronic)? How will effects of these discharges impact threatened and endangered species, migratory birds, and old growth/late successional forest characteristics? **B.20**

e) How will leachates be detected and handled including ground and surface water contamination? What is the hydrology of the area (i.e. where does ground water and surface water go)? **B.21**

f) How will water quality of surrounding lakes, marshes, and streams be affected? How will this relate to fish health and potential reduction of fish prey base for eagles and other fish eating birds? **B.22**

3) What will the impacts of fragmentation be to old growth and late successional forest characteristics and associated species (i.e. fragmentation of northern spotted owl habitat while benefitting their potential predators such as the great horned owl) due to the increases in road size and density, transmission line and pipeline corridors, open areas where well pads and other facilities will be placed?

4) What impacts will occur from increased traffic and other human activities including increased fire risk?

We appreciate the opportunity to participate/comment on development of this project and encourage you to continue keeping us informed of your progress through the streamlining process. The endangered and threatened species list for the Forest has not changed since the latest update sent from our office on July 3, 1997. Please notify us if any potential effects to threatened or endangered species arise. If you have any questions, contact Leonard LeCaptain (541)885-8481.

Sincerely,

Curt Mullis

for Steven Alan Lewis
Project Leader

cc: USFWS, Attn: ARD-ES, Region 1, Portland, Oregon
Diane K. Henderson, Forest Supervisor, Modoc National Forest
Nadine Kanim, USFWS, Klamath River Fish and Wildlife Office
BLM, Attn: Area Resource Manager, Alturas Resource Area Office, Alturas, California

Letter C

U.S. Geological Survey
Volcanic Hazards Program, MS 910
345 Middlefield Road, Menlo Park CA 94025
Phone 415-329-5210, FAX 415-329-5203
E-mail: jdnolan@mojave.wr.usgs.gov

14 July 1997

TO: Patrick Muffler

FROM: Julie Donnelly-Nolan

SUBJECT: Draft EIS/EIR for Fourmile Hill Geothermal Project

Thanks for letting me have a look at the EIS/EIR for Calpine's proposed development at Medicine Lake volcano. I did not receive a copy. I scanned through the document and looked fairly carefully at pages related to the geology. On page 3-4, I am credited with saying that the caldera "was created during a catastrophic eruption approximately 10,000 to 12,000 years ago (Donnelly-Nolan 1990)." I didn't say that and it isn't true. C.1 Same goes for p. 3-7 where I am credited with saying that "Some of the most recent lava flows in the Medicine Lake area may be only 500 years old (Donnelly-Nolan et al. 1989)." Not true unless Lassen is considered to be in the Medicine Lake area! C.2 Otherwise there are lots of small errors (naming, spelling, locations, etc.) in addition to failure to discuss the Dzurisin et al. paper in the context of seismicity and ground subsidence. The geology reference list is remarkably short (p. 7-2). C.3

U.S. Geological Survey
Volcanic Hazards Program, MS 910
345 Middlefield Road, Menlo Park CA 94025
Phone 650-329-5210, FAX 650-329-5203
E-mail: jdnolan@mojave.wr.usgs.gov

18 September 1997

TO: Bob Tilling, Chief Scientist

FROM: Julie Donnelly-Nolan

SUBJECT: Letter by Peter D. Stent

I would like to provide some historical context relating to Mr. Stent's letter of Sept. 2, 1997, to Director Gordon Eaton.

A few years ago I suggested to Bob Mariner that careful study of the large springs near the southern limit of lavas from Medicine Lake volcano might provide information about the geothermal system at the volcano. My suggestion was based on knowledge of work previously done by Manuel Nathenson at Crater Lake. Bob agreed that the large springs forming the headwaters of the Fall River might provide important information. Subsequently he sampled some of the springs and found chloride contents higher than expected. However, he was refused access to private property where critical springs were located. Thus, the results of the initial work were not definitive. Only recently has Bob obtained permission to collect springs that were previously off-limits to him.

Also, I should note that Bob and I have tried repeatedly for many years to obtain permission from private companies to sample fluids from deep geothermal drill holes, but without success. Therefore we do not know the chloride content of the geothermal fluids.

cc: R. Mariner
M. Nathenson
J. Lowenstern
R. Sharp

Letter D

STATE OF CALIFORNIA—THE RESOURCES AGENCY

PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

October 16, 1997

Mr. Randall Sharp
Project Environmental Impact Statement/
Environmental Impact Report Coordinator
Fourmile Hill Geothermal Development
US Forest Service/US Bureau of Land Management
800 W 12th Street
Alturas, California 96101

Dear Mr. Sharp:

Fourmile Hill Geothermal Development Draft
Environmental Impact Statement (EIS), SCH #96062042

The California Department of Fish and Game (DFG) has reviewed the subject draft EIS located within the Glass Mountain Known Geothermal Resource Area (KGRA) on the Klamath and Modoc national forests in Siskiyou and Modoc counties. The project proposes to construct a 49.9-megawatt (MW) geothermal power plant with five production well pads and associated pipelines, access roads and a 24-mile transmission line. Approximately 388.5 acres of habitat will be affected by the proposed project. D.1

The draft environmental impact report (EIR)/EIS addressed many of our previous concerns including floristic surveys that locate special status plant species. Identified populations of special status species will be marked and avoided. In addition, wetlands located along a segment of the proposed transmission line will also be avoided. D.2

However, some issues that we identified in our June 17, 1997, letter were not adequately addressed in the draft EIR/EIS. This includes the lack of hydrologic data to verify that the proposed project would not impact surface or ground water recharge of Fall River Springs. Figure 3.3-4 of the draft EIR/EIS demonstrates the uncertainty in information on regional ground water flow directions. D.3 Collection of base line water levels are included with the mitigation (4.3.1a), monitoring and reporting program for hydrology (page 5-4). The project proponent proposes to submit "a hydrologic monitoring plan for the caldera and a defined local area". However, since there is a lack of evidence that the Medicine Lake Highlands are not related to Fall River recharge, the monitoring should include the Fall River area in the hydrologic monitoring plan. D.4 Furthermore, the mitigation measure for monitoring the effects of the project on ground water levels states that "...groundwater pumping rates shall be reduced if monitoring detects significant adverse impacts to water availability...." There is no mention of what the performance standards are that would lead to a conclusion of "significant" adverse impact. These levels should be determined prior to commencement of any project construction or operation. D.5

In addition, we wish to reiterate our concerns for increased road densities in the project area. The project proposes to construct two miles of new roads. Excessive roads (>1.5 miles of open road/mile^2) are considered detrimental to wildlife. The DFG recommends that an equal number of miles of nonessential roads within the project area be closed permanently or gated to reduce the impact of the new road construction. D.6

While the draft EIR/EIS does address the cumulative effects from both the Fourmile Hill Geothermal Project and the associated Telephone Flat Project, the draft EIR/EIS should also include the environmental repercussions of full buildout of the KGRA. The draft EIR/EIS indicated that the potential geothermal resource was originally estimated at 500 MW of electric power. An analysis of the cumulative environmental impacts of meeting this target should be addressed. This should include the amount of habitat that would be affected if future power plants, well pads, road construction, etc., would be built if the 500 MW target was met. D.7

Thank you for consideration of these comments. If you have any questions regarding these comments, please contact staff biologist Ms. Terri Weist at (916) 459-1129.

Sincerely,

Richard L. Elliott
Regional Manager

cc: Ms. Terri Weist
Department of Fish and Game
1724 Ball Mountain Road
Montague, California 96064

Letter E

COUNTY OF SISKIYOU
Planning Department
P.O. BOX 1085 • YREKA, CALIFORNIA 96097
(916) 842-8200 • FAX (916) 842-8211

RICHARD D. BARNUM
PLANNING DIRECTOR

September 25, 1997

Mr. Randall Sharp
U.S. Forest Service, Bureau of Land Management
Fourmile Hill Geothermal Project EIS/EIR Coordinator
800 West 12th Street
Alturas, California 96101

Subject: Draft EIS/EIR Fourmile Hill Geothermal Development Project

Dear Mr. Sharp:

I have had the opportunity to review the Draft EIS/EIR for the Fourmile Hill Geothermal Project and find that the analysis provided appears to be thorough and well documented. E.1
However, it may be appropriate to add to the document quantification of the effect vapor emissions will have under cold weather inversion conditions. It is my understanding that effects, such as fog or hail, depends on the constituent of the emission. Discussion and mitigation in this particular area, if needed, may be appropriate. E.2

As you are aware, the Administrative Draft of this document was also separately reviewed for adequacy by a legal consultant. Upon conducting my independent review of the document, I noted that the comments and suggestions provided by the critique were reflected in the Draft document as well. E.3
I would like to add that I was unable to find discussion pursuant to Section 15128 of the CEQA Guidelines, which requires an EIR to contain reasons that various possible significant effects of a project were not determined to be significant and, therefore, not discussed in detail in the EIR. Ideally, this item should be a separate sub-heading under Section 4. The Guidelines also provides that such discussions that are contained in the Environmental Assessment/Initial Study (EA/IS) may be attached tot he EIS/EIR as reference. E.4

In closing, this response is tempered by additional input and recommendations made by the Siskiyou County Planning Commission to the Board of Supervisors, at the time of certification of the Final EIS/EIR. I anticipate that the Planning Department will be notified of the availability of the Final EIS/EIR in order to schedule the appropriate meeting and presentation to the Siskiyou County Planning Commission. E.5

Thank you for the opportunity to comment. If you have any questions, please contact me immediately.

Sincerely,

Richard D. Barnum
Planning Director

RDB:lrf

cc: Board of Supervisors
C. Brent Wallace, County Administrator
Frank DeMarco, County Counsel

Letter F

Cal/EPA

North Coast
Regional Water
Quality Control
Board

550 Skylane Blvd
Suite A
Santa Rosa, CA
5403
707) 576-2220
AX (707) 523-0135

Pete Wilson
Governor

September 30, 1997

Patrick J. Griffin
Siskiyou County Air Pollution Control District
525 South Foothill Drive
Yreka, CA 96097

U.S. Department of Interior -- Bureau of Land Management
Alturas Resource Area
708 West 12th Street
Alturas, CA 96101

U.S. Department of Agriculture
Forest Service, Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Re: CALPINE FOURMILE HILL GEOTHERMAL DEVELOPMENT PROJECT
(SCH No. 96062042)

Gentlemen:

The North Coast Regional Water Quality Control Board is, pursuant to California Environmental Quality Act (CEQA), a Responsible Agency with interest in recognizing and minimizing water quality impacts of projects. It is also, pursuant to California Water Code and Federal Clean Water Act, the primary water quality control regulatory agency with jurisdiction over activities within the North Coast Region which may affect water quality. The geothermal well sites and proposed powerplant site within Sections 21, 28 and 29 of T. 44 N, R. 3 E., MDB&M (northwest of the hydrologic divide which runs between Badger Peak and Grouse Hill) in the Glass Mountain KGRA are within the North Coast Region. We expect to receive a Report of Waste Discharge from the owners and operators of the project. We are also required to utilize the CEQA document which is being prepared at this time to inform us of potential impacts and mitigations related to the project. Finally, we expect to prescribe Waste Discharge Requirements and a Monitoring and Reporting Program to ensure that waste discharges are managed and monitored to protect surface and groundwater resources. F.1

This Regional Water Board and its staff have been regulating the water quality impacts of geothermal development at the Geysers in Sonoma and Lake Counties since its inception in the 1960s. Although the Geysers is different from Glass Mountain-Medicine Lake Highlands in many very significant ways; we expect to see the following issues:

- Drillsite Waste Management. The drilling muds and other materials which end up in pits, tanks and sumps are highly-variable and are not always managed as planned. This issue is best resolved by ensuring that the site is closely monitored and that the operator has well-conceived contingency plans. F.2
- Truck wrecks. Materials and fuels transported to the project, materials transferred between sites and wastes hauled away for disposal off-site will be trucked over narrow mountainous roadways, sometimes in marginal weather conditions; there will be accidents involving these materials and causing their release. This issue is best resolved by pre-planned and disciplined traffic management and well-conceived communication and contingency planning. F.3
- Pipeline leaks and breaks. The Geysers has unstable ground and high rainfall conditions which are not similar to the case at Glass Mountain; nevertheless, corrosive conditions and isolation are likely to contribute to leaks and spills of geothermal fluids. This issue is best resolved by close monitoring and well-conceived contingency plans. F.4
- Contaminant emissions and surface deposition (fallout). Geothermal fluids are not consistently identical from well-to-well and time-to-time -- different levels of (potentially-) odiferous, corrosive, scale-forming and toxic compounds are emitted with steam and water during well-test blowing, then are part of the water-phase material which is condensed, commingled, used, treated and prepared for reinjection. These manipulations lose (into the surface environment) steam, water and whatever geogenic compounds are within geothermal fluids. Analyses of the mixtures are said to be "proprietary", thus are not provided in the DRAFT EIR/EIS. Whether or not these emissions affect water quality (or other uses of the public domain) is difficult to monitor and even more difficult to predict. Our monitoring at the Geysers reveals that powerplant runoff wastewater is consistently toxic from a variety of pollutants, thus it is added to the other wastewaters for reinjection. We do not have good information about the consequences of emissions which are deposited outside the powerplant fence line. This issue is best resolved by open, documented assessment of the baseline and monitored conditions and periodic "is there a problem?" reviews. F.5

Our mission is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

We have reviewed the July 1997 DRAFT EIR/EIS and other materials in files of this Regional Water Board and our counterpart agency -- the Central Valley RWQCB (which has jurisdiction over discharges and activities which may affect water quality in the territory southerly of the hydrologic divide) and offer the following comments:

- Executive Summary page S-3. The section headed "Approvals" should recognize the Regional Water Board's jurisdiction and duty to regulate water quality impacts of the project. It should also recognize that the EIR/EIS, when completed, will assist the Regional Water Board in assessing the environmental impacts of its regulatory actions. F.6

- Tables S-4 and S-5. We expect that these Tables will be revised to reflect the comments and suggestions received about the DRAFT. F.7

- Introduction -- Responsible Agencies [pages 1-9 and 1-10 (Table 1.4-1)]. It is the North Coast (not the Central Valley) Regional Water Quality Control Board which has jurisdiction under both Clean Water Act and California Water Code at this project site. It may be helpful and correct to also recognize that the project may affect groundwater which may flow (or be affected by fallout from air currents) in a southerly direction from the project site (toward Medicine Lake and Pit River tributaries) and into the jurisdictional area of the Central Valley RWQCB. The project site and its neighborhood are not yet sufficiently explored and described to enable unambiguous declaration of which hydrologic regimes may be affected by the project. In the event of follow-on development of other ("Telephone Flat") projects, this ambiguity will become more important and in greater need of resolution. F.8

- Introduction page 1-13. The description of completed geothermal activities mentions 25 "temperature core" wells and 4 "deep exploration test wells". Additional descriptive material about these wells is provided at page 3-35. The "proprietary" nature of information derived from these wells prevents reviewers from forming rational conclusions about what is known and not-known regarding groundwater resources of the site and its surrounds. F.9 Neither Calpine nor CalEnergy have initiated the proposed/permitted/mitigated "exploration projects" described on pages 1-13 through 1-15. We note from the earlier (1984) Glass Mountain KGRA leasing Environmental Assessment that there was to be an "exploration phase" of the KGRA leasing project and that the exploration phase -- particularly as it provides information about water resource issues -- is "...essential to answering the questions regarding impacts of development. Exploration will yield necessary information on temperatures, pressures, and fluid characteristics at depth which are currently F.10

only speculation." (Supplemented Environmental Assessment -- Geothermal leasing...., September 1984, page 40). We believe that additional details about the geothermal fluids must be provided to this RWQCB as part of the Report of Waste Discharge to be submitted by the owner/operator; we recommend that those details be provided in the EIR/EIS.

- Introduction pages 1-17 through 1-21. The summary of key issues and concerns includes mention of water quality and quantity concerns and promises that they will be addressed in Chapters 3 and 4 of the EIR/EIS. This section of the document recognizes the relevance of the North Coast RWQCB's Basin Plan. F.11

- Alternatives pages 2-1 through 2-3. The DRAFT does not consider deferral of Development-phase activities until completion and disclosure of Exploration-phase activities and results; it seems to trivialize an essential facet of KGRA management which was established in the 1984 Environmental Assessment. F.12

- Section 2.2 Alternative 1 -- Proposed Action. This section of the DRAFT elaborates on descriptions of three phases of actions: Construction, Operation and Decommissioning. There is no mention of a fourth possible phase which has become essential to operations at the Geysers -- Water Import and Injection. As the steam yield of the Geysers field was developed and then began to decline (well before 45 year's of development), the operators determined that the deficit between water mass extracted and reinjected could be made up from other water sources. In this case, the first step was to tap Geysers-area streams and inject their waters into the geothermal zones. Today, the operators are constructing a system to import and inject 7.8 million gallons per day into the southeast portion of the steamfield; in the near future, they may participate in another project to import even greater quantities for injection into the western portion of the field. Even though the Glass Mountain resource is believed to be much "wetter" and up to eighty-percent reinjectible; perhaps it is appropriate to consider Import/Injection as a reasonable additional phase of Glass Mountain KGRA development which will be considered before the project is decommissioned? If so, the EIR/EIS must recognize possible sources of such water and predict the impacts of its development. F.13

- Section 2.2 -- Well Drilling and Testing (page 2-14), Geothermal Fluid and Runoff Controls (page 2-15) and Cooling Tower (pages 2-28 and 2-29). The DRAFT begins to describe the release of 2.9 million pounds per hour (for 30 days -- over two billion pounds) of well-testing steam and water. Some of this F.14

is to be captured in lined sumps and pumped back into wells for disposal. The DRAFT also estimates cooling tower drift at 448 lbs/hr (for the life of the project -- 177 million pounds). At page 4-27 a "net loss of fluids of approximately 475,000 pounds per hour" (for the 45-year operation phase) is mentioned. Our records of sump-waste testing and the DRAFT at pages 2-29 (describing cooling-tower drift) and 4-222 reveal that the wastewater has elevated salinity, acid-forming constituents, arsenic and boron levels. Appendix F provides estimates of emissions, but does not include the basis of the estimates. We believe that the consequences of these constituents, as they are released to the environment and as they may end up in the water resources of the area, must be discussed in the EIR/EIS. These activities and their water quality impacts will be regulated by the RWQCB. We recognize that the bulk of wastewater produced at the project will be injected to the geothermal field in conformance with regulations of other agencies -- it is the portion which is not injected which must be described and assessed by this EIR/EIS. We expect to coordinate our monitoring and reporting program with the other agencies so that the public can be assured that the useable water resources of the area are being protected. F.15

- Section 2.4 and Table 2.4.1 -- Comparison of Alternatives and Key Issues. Between Section 1-- Introduction, identifying Key Issues (including questions about water quality impacts) which emerged during "scoping", and this section of the DRAFT, the matter of "Effects to regional water quality or quantity" for the Selected Alternative project have been sufficiently diminished to be deemed to be "N", that is of "No Effect". Perhaps the rationale for- and merits of the DRAFT's dismissal of a key issue will be provided in a subsequent section of the DRAFT? If not, the text and Table should be revised. F.16

- Section 3.3 Hydrology. This section of the DRAFT EIR/EIS summarizes what is known about surface and groundwaters near the project -- very little pre-project "background" work (which can be revealed to the public) has been done. At page 3-27 a proposal from USGS is mentioned and we have been provided with letters mentioning work done or proposed by other parties. Perhaps because the Exploration-phase work has not been done (thus no results of monitoring it are available) nor has there been a concerted effort to describe conditions at the proposed powerplant/well sites, this DRAFT cannot adequately describe the to-be-affected environments. If that is the case, it also cannot describe nor dismiss-to-insignificance the impacts of the proposed development. F.17

- Section 3.4 Geothermal Resources, Chemistry of Fourmile Hill Geothermal Fluids. Absent a factual description of fluids which might emerge from the project site, the DRAFT includes Table 3.4-1 portraying results from analysis of a sample from Well 87-13 -- several miles southeast of the project site. Data from our files shows comparable levels of Table 3.4-1 constituents from sump samples at Wells 68-8 and 21/31-17 (also southeast of the project site). Analysis of near-geothermal fluid emitted from Well 44-33 (several miles east of the site) also fits the framework of Table 3.4-1. We have two values for boron at 45.4 and 14.9 mg/l and four values for arsenic at 10.8, 7.3, 6.02 and 5.06 mg/l. Sections 2 and 4 of the DRAFT acknowledge the likelihood of boron and arsenic in geothermal fluids. We believe that facts about geothermal fluids were to have been obtained by monitoring of exploration-phase work; instead, we are now reviewing a development-phase proposal without benefit of those facts. This deficiency frustrates our attempts to assess possible impacts of the project. F.18

- Section 4.2.11 Effects of Deposition of Air Emissions. This section of the DRAFT acknowledges that emissions of geothermal fluids will fall onto area soils. Runoff from, or water percolating through those soils will contain the geogenic compounds which were in the fluids. The DRAFT dismisses the potential impact of these emissions with a declaration that the soils of the area are expected to have a makeup similar to the fallout because they are derived from similar volcanic rocks. We believe that the DRAFT must assess the consequences of many year's release of fluids containing parts-per-million levels of boron and arsenic from well-vent and tower-drift/evaporation; moreover, it should be a simple matter to include analyses of soils as a part of the background information provided in the EIR/EIS. This subsection of the DRAFT declares that the water quality effects of materials transported to surface waters are addressed in Section 4.3 and that effects on soils would not be significant nor would they need mitigation. F.19

- Section 4.3 Hydrology. This section begins with a discussion of the regulatory framework and adequately describes the role of the RWQCB. It summarizes recognition of potential significant impacts of the project and declares that mitigation measures are available to minimize or eliminate all of the potential impacts. Those mitigation measures and a program to monitor and disclose their performance will be included in the Regional Board's Waste Discharge Requirements. F.20

- Section 4.3.1 covers predicted effects of water use. It does not anticipate need for development of water sources for injection to the steamfield (as has occurred at the Geysers) in the event such injection might prolong the production of steam. The suggested mitigation is a hydrologic monitoring plan. F.21

- Section 4.3.2 covers effects of geothermal fluid production and injection on water **quantity**; it suggests that there will be no effects yet adds a mitigation measure requiring operational changes if quality/quantity impacts are discerned. F.22

- Section 4.3.6 covers water quality effects. This discussion begins with a dismissal of any potential adverse effects from the proposed project, yet also states that effects could potentially occur through accidental releases of geothermal fluids. There is no direct recognition of the consequences of emitting fluid-borne pollutants such as arsenic and boron into the environment of the project site for 45 years. Is there no fallout nor washout? Where is the "away" that these emissions go? Section 4.3.7 hypothesizes consequences of an airborne plume impacting Clear Lake or Medicine Lake and mitigates via distance and dilution. F.23

In summary, we find that this DRAFT EIR/EIS does not thoroughly describe the "setting" into which the project will be imposed, it does not disclose the composition of wastes which will be emitted into the environs of the project and does not assess the impacts of those emissions. We believe that this DRAFT must be revised to include disclosure and analysis of the effects of all environmental emissions and their transport and fate. F.24

The status of arsenic as a primary drinking-water contaminant at 0.50 mg/l and as a cancer-risk factor at even lower concentrations, plus the complexities arising from assays of different compounds containing the different valence-states of this element suggest that some focus be placed on the occurrence of arsenic in the geothermal fluids. F.25

The status of boron as a plant-toxic element in soil and water suggest that similar focus be placed on this element. F.26

Thank you for this opportunity to comment. Questions may be directed to me at (707) 576-2655.

Sincerely,

John R. Hannum
Senior Water Resources Control Engineer

JRH:tab/geot0909.wpd

cc: State Clearinghouse

Central Valley RWQCB-Redding

SWRCB, Attn: Rick Humphreys

Our mission is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

Letter G

STATE OF CALIFORNIA — THE RESOURCES AGENCY

PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
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August 5, 1997

Reply to: USFS970714A

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Subject: Fourmile Hill Geothermal Development Project DEIS/EIR

Dear Mr. Sharp:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR) for the proposed Fourmile Hill Geothermal Development Project (SC No. 96062042).

I understand that the purpose of this document is to identify potential environmental impacts that would result from the proposed construction, operation, and decommissioning of a 49.9 megawatt geothermal power plant with associated production and injection wells, well pads, pipelines, transmission line, and access roads. The proposed power plant and wellfield would be located on Federal geothermal leases CA21924 and CA21926 in the Glass Mountain Known Geothermal Resource Area on the Klamath and Modoc National Forests in Siskiyou and Modoc Counties, California. The proposed transmission line would extend east from the power plant site for approximately 23.4 miles through the Klamath and Modoc National Forests to a proposed substation along the existing Malin-Warner transmission line near Perez, California. Alternative transmission line routes have been defined and are analyzed in the DEIS/EIR. G.1

Once the federal lead agency for the proposed action has defined the area of potential effects (APE) for the project, I anticipate having the opportunity to comment on the effects of the undertaking on historic properties, pursuant to 36 CFR 800.4.

Thank you again for seeking our comments on your project. If you have any questions, please contact staff archaeologist Chuck Whatford at (916) 653-2716.

Sincerely,

Cherilyn E. Widell
State Historic Preservation Officer

Letter H

DISTRICT 36 LEGISLATIVE ACTION OFFICE
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Truckee, California 96161
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E-Mail:bdart@juno.com

AMERICAN MOTORCYCLIST ASSOCIATION

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Project
800 W 12th Street
Alturas, CA 96101

September 10, 1997

Dear Mr. Sharp

In response to the Fourmile Hill Geothermal Development Draft Environmental Impact Statement/Environmental Impact Report, I am submitting comments on behalf of District Thirty Six of the American Motorcyclists Association (AMA), the California/Nevada Snowmobile Association (CNSA), the Blue Ribbon Coalition, and my family. The proposed project will have significant unmitigated negative impacts under all action alternatives, with the proposed alternative having by far the most negative impacts as identified within the Draft EIS/EIR document. Additionally, the document did not address at all some negative impacts. We also question why the cumulative impacts of the Telephone Flat Project were not addressed more completely. H.1 H.2 H.3

AMA District 36 is a non-profit association of several thousand northern California and Nevada families that participate in motorized recreation on public lands in the region, including the Medicine Lake Highlands. I am the Legislative Officer for AMA District 36. The California-Nevada Snowmobile Association (CNSA) also consists of several thousand families that participate in snowmobiling in the region, and particularly the Medicine Lake Highlands. I am a past member of the Board of Directors CNSA, and I have been authorized by CNSA President Ron Rawlings to comment on behalf of CNSA regarding this project. The Blue Ribbon Coalition is a national coalition of over 500,000 motorized recreationists and organizations, of which I am also a member of the Board of Directors. I grew up in Tulelake, where my parents and my wife's parent's still reside. I have visited Medicine Lake regularly since the mid 1950's during the summer and fall, and since the mid 1960's during the winter on snowmobiles. My wife's parents own a cabin on a Forest Service lease at Little Medicine Lake, which we use regularly both winter and summer. H.4

Medicine Lake has always been extremely important to regional residents, and increasing so to the growing number of visitors from more distant origins, as the only nearby high elevation clear water lake in California. It is a major recreation resource for sight-seeing, fishing, water-skiing, camping, hiking, hunting, snowmobiling, cross country skiing, off-highway vehicle recreation, and just getting away from the heat during the summer months. The Medicine Lake Caldera retains a very natural appearance overall, which is

also a significant part of its intrinsic value. The absence of significant night time light sources for scores of miles is also valued, since stargazing is outstanding in the area.

My comments are focused on visual, noise, recreation conflicts, light pollution, transportation, and cumulative impacts of Fourmile Hill and the Telephone Flat projects.

Visual Impacts

The visual impacts of the proposed power line segments A1, A2, and B2 are not adequately mitigated , cause a significant adverse impact, are inconsistent with Forest Visual Quality Objectives, and are totally unacceptable. These segments are all within the Medicine Lake caldera, and would be a visual blight upon an otherwise near-natural appearing landscape. The proposed project calls for clearing of vegetation within the 125' right of way, with all 50 to 75' mature trees typical of the proposed alignment being cut; creating a very visible scar that will never have a natural appearance during the life of the project. H.5

A1 is the most offensive, since it is visible from the beach, , the entire lake, the residences on the southeast corner of the lake, the residences on Little Medicine Lake, most of the campgrounds, roads 49, 97, 43N47, 43N48, 44N50, 43N99, & 43N21, Schonchin Springs, Little Mt. Hoffman Lookout, The old ski hill, the hiking trail to the Medicine Lake Lava Flow, and Little Medicine Lake, Arnica Sink, Glass Mountain, and all surrounding peaks or high points. Apparently A1 was selected primarily due to the tie-in to the Telephone Flat project, but this is not made clear in the document. Telephone Flat could be serviced without the A1 segment though, using segment A2. In any case, segment A1 is absolutely unmitigable and accordingly unacceptable. H.6

Segment A2 is also unacceptable even though it will not be visible from many of the previously mentioned sites. The proposed alignment crosses directly over the only surface geothermal feature in the area, the Hot Spot. This is a major destination for snowmobilers in the winter, and is the destination of many hikers as well. It is likely to hold significance for Native Americans. This segment would call for removal of a significant amount of Red Fir forest, which is not wide-spread in the area. This Red Fir habitat is favored by winter fur bearers generally and should be protected. Without the Telephone Flat Project, there is no need to use A2 or A1, as A3 would serve the same purpose, be similar in distance, and has less overall negative impacts. H.7

Segment B-2 is also unacceptable due to visual impacts, even though it is not visible from many of the previously mentioned sites. This alignment would cross 43N53 and the road circling Lyons peak and Red Shale Butte. Lyons Peak is a popular vista point, whose viewshed would be dominated and degraded by segment B2. B2 is also unnecessary without the Telephone Flat Project. H.8

I didn't see any reference to visual impacts to visitors to the Little Mt. Hoffman Lookout, a very popular destination for sightseers. Two years ago the old lookout was renovated and is now available on a reservation basis for campers, which has made it an even more popular destination. The Final EIS/EIR must analyze the impact of the project on visitors to Little Mt. Hoffman. H.9

Most snowmobilers travel to the top of all local ridges and peaks H.10

to experience the views. From any higher observation point, the transmission lines and their 125 wide strip that has been cleared of all trees over 12' will be painfully evident. The final EIS/EIR must analyze and adequately mitigate the impact on the proposed project as well as the cumulative impact of this project and the Telephone Flat project to visitors to Little Mt. Hoffman and all of the peaks and vista points around and within the Medicine Lake Caldera available to snowmobilers and hikers.

The document discusses possible power line construction methods, with either two or three wood pole structures being used in most areas, with a single steel pole used as a mitigation measure as A1 crosses some forest roads. The single steel pole requires less right of way width, and should be specified in the final EIS/EIR for any transmission line that is built in forested areas so that tree removal is minimized, and subsequently, the size of the visual scar is minimized.. Additionally, a single steel pole painted to blend with the local forest, is less obvious than three wooden poles in a straight line. H.11

In summary, the visual impacts of any power line segments through the Medicine lake caldera are unacceptable. The proposed mitigation measures for the proposed project alternative do not eliminate significant adverse impacts on the visual environment in the Medicine Lake Caldera. Forest Visual Quality Objectives are not achieved. This area is too important to the general public for its unspoiled visual characteristics to allow something as degrading as a power line to be constructed through it. H.12

Without the Telephone Flat Project, there is absolutely no need for power lines within the Medicine Lake Caldera, and all alternatives with segments A1, A2, and B2 should be rejected. H.13

Transportation Issues

The primary transportation issue is one that was not adequately addressed or mitigated in the document: impact of plowing and blowing snow on roads designated and groomed for snowmobile use. The Medicine Lake Highlands, along with lands connecting towards Deer Mountain, Mt. Shasta, and McCloud have always been used by snowmobilers due to the excellent snowfall and available terrain. The area has become a premiere snowmobile destination in recent years since snowmobile staging areas and warming huts have been developed and constructed at Pilgrim Creek (near McCloud), Deer Mountain (near Weed), Four Corners (near Macdoel) and Door Knob (near Tulelake/Lava Beds National Monument). These staging areas are linked with a vast network of forest roads that are now groomed for snowmobile travel, all paid for by snowmobilers through grants from the California Green Sticker program administered by the Off-Highway Motor Vehicle Recreation to the Modoc, Klamath, and Shasta-Trinity National Forests. This program would be adversely impacted under all action alternatives. H.14

The NEPA/CEQA processes both call for a full range of alternatives to be considered. All action alternatives call for keeping 44N01 and 44N64 open year around by plowing and or blowing snow from the road, which is an inadequate range of alternatives. Other possible alternatives should evaluated such as snowcat access, snowmobile access and helicopter access during winter months, all of which would not displace existing snowmobile use H.15

from designated and groomed routes and not create a potentially fatal safety hazard to snowmobilers

44N01 is a major groomed snowmobile route out of the Four Corners Staging area all the way to Forest Route 49, and the primary and only direct route to the Door Knob Staging Area from Four Corners. All action alternatives would eliminate 44N01 as a snowmobile route altogether and no alternatives or mitigation was discussed, an omission that must be corrected. H.16

Additionally, 44N64 crosses another groomed snowmobile route, 44N54, immediately adjacent to the proposed well pad and power plant site. Plowing across 44N54 would eliminate it as a groomed snowmobile route. H.17

In addition, a serious safety hazard to snowmobilers is created by snow plowing in an area that has traditionally never had snow removal. Hitting a plowed road, with sudden drop-offs from the snowpack onto dirt or pavement, with sheer walls on each side is a major safety hazard, and has resulted in multiple fatalities already here on California National Forest lands in recent years. Snowmobilers are especially vulnerable since travel is not confined to specific routes or roads, but occurs throughout the forest wherever there is sufficient snow cover. The entire length of the plowed road would be a safety hazard to snowmobilers. H.18

Another significant negative impact and safety hazard would be created by the entire well pad and the related pipeline network adjacent to groomed snowmobile route 44N54. The heat loss from the above ground pipeline network would likely create open ditches through the snow. These ditches would be a significant safety hazard that could cause death or serious injury to any snowmobiler that hit one. Even if 44N54 was closed to snowmobiling, which would be unacceptable, snowmobilers travel cross country as well and could come into the well pad area from any direction. H.19

Fencing is also hazardous and difficult due to the varying snow depths each year, plus difficult to maintain in deep snow conditions. During heavy snow years, snow depth could cover most or all of any fencing, creating another potentially fatal hazard to snowmobilers. Adequate measures must be taken to warn snowmobilers and make the fence visible to snowmobilers, including after dark since night riding is very common. H.20

In addition to failing to identify the significant negative impact of road plowing on winter recreation, the document failed to address the cumulative impact of this project combined with the Telephone Flat Project. If both projects were to approved with snow plowing included, several other groomed snowmobile routes in the Arnica Sink-Glass Mountain-Lyons Peak-Forest Route 97 vicinity would be either wiped out or crossed. The two projects combined would have a huge negative impact on the existing already approved snowmobile route network. The Telephone Flat Project would be especially egregious since it would penetrate the Medicine Lake Caldera and violate its pristine winter condition. Snow depths are typically much deeper at the higher elevations, which attracts higher amounts of snowmobile use, allows easier cross-country travel, but compounds both the safety hazard, due to higher berms dropping into deeper road cuts, and the expense to keep roads open in the deeper snow depths encountered with the Medicine Lake Caldera. The cumulative impact of this project combined with the Telephone Flat project must be addressed and mitigated in the final EIS/EIR. H.21

The document discusses a carpool area near the Four Corners staging area, but no specifics were found. The Final should address this deficiency. How large is the carpool area? Where exactly will it be located? Will the Four Corners staging area be used during any phase of the project? Who will plow the carpool area? Where will snow removal equipment be stored while not in operation? H.22

The document states that snowmobilers could drive up 44N01 to a gate at the intersection of 44N01 and 44N64 and stage informally. This leads to questions about how adequate width for parking without obstructing through traffic will be accommodated? Will there be adequate room to turn a vehicle and trailer around? What kind of measures will be taken to mitigate the safety hazard created to west bound snowmobilers on 44N01 as they approach 44N64? Will this gate be locked year around or only in the winter. If it is locked year around, is mitigation necessary to compensate for closing this road and what would that mitigation be? H.23

The preferred alternative for snowmobilers is to abandon the road plowing in the winter and access the power station and well pad site by snowcat. The document calls for a snowcat on site already, since there will be times when weather conditions would close the road for periods of time due to heavy storms and deep snow accumulations. Even if another snowcat is needed, the costs are not likely to be significantly higher since removing snow over the length of road involved, 11 miles, is not inexpensive, and would require the purchase, operation, and maintenance of a grader/plow and a rotary plow, plus employee's to operate this equipment. If snowcats are used instead, all weather access will be assured for the project, snowmobilers will not lose two important groomed snowmobile routes, and an eleven mile long potentially fatal hazard to snowmobilers will not be created. H.24

Light Pollution

Medicine Lake is an outstanding location for stargazing due to the clean air and lack of nearby significant light sources. If adequately mitigated, it is not likely that the Fourmile Hill Project will have a significant adverse impact on existing conditions. Every effort should be made to limit light emissions into the night sky, particularly from the power plant site and well drilling activities. H.25

The cumulative impacts of this project combined with the Telephone Flat project must be examined more closely, since Telephone Flat has much more potential for light emissions in the Medicine Lake Caldera, the most sensitive area. The power plant and well drilling at Telephone Flat would contribute a significant amount of light pollution, especially well drilling, which, if a similar plan is adopted, would occur every other year throughout the project life. H.26

One area that needs more mitigation involves transmission line construction within the Medicine Lake Caldera, should segments A1, A2, or B2 be constructed. The document allows construction activity from 7 AM to 10 PM. This should be changed to no later than 7 PM, which would eliminate the need for any lighting throughout the construction season. H.27

Noise

One of Medicine Lakes attractions is that it is relatively quiet. Local vehicle traffic and boating are the primary sources. Even the boating noise is very low during most of the day due to the restrictions on high speed ski boats that limit operation between the hours of 11 AM to 4 PM. Even though the estimated levels are low numerically, they would be an annoyance to anyone enjoying the existing low noise levels. Even when project noise is not measurable above background levels, but is audible, it would annoy some people. H.28

After reading the sections on noise, I am still not clear on how much noise would reach the Medicine Lake area. Table 4.14-1 says that ambient noise levels at all Medicine Lake receptor are three to 8 db below sound levels of construction from drilling 2 wells. This would indicate that project noise would be clearly audible from all test areas in the Medicine Lake basin, which would be unacceptable since it would last three construction seasons. Even the power plant construction alone would be 5 db above ambient levels at Little Medicine Lake, which would make it plainly audible. However, table 4.14-3 indicates that well drilling and power plant operation would be 7 to 13 db below ambient noise, which seems inconsistent. Even if only one well is being drilled, cumulative noise would only be 3 db less than two wells. This needs to be clarified. H.29

Transmission line construction noise would be the highest impact on the Medicine Lake Caldera, and additional mitigation measures should be specified. Mitigation measure 4.14.2a has soft language (*"Impact tools **should** be shielded or shrouded"*, and *"equipment **should** have a muffled exhaust")* that must be changed to hard language (*"Impact tools **shall** be shielded or shrouded"* and *"equipment **shall** be muffled"*). Mitigation measure 4.14.2b must be changed to limit construction activities to7 PM in the evening instead of 10 PM. Another alternative that would confine transmission line construction activities to times when visitation is low, such as mid September to mid November should be considered if segment A1 is built over our objections. H.30

Noise from well drilling will be going on every other year throughout the life of the project, and should have mitigation measures that would keep noise levels below background, and optimally inaudible within the Medicine Lake Caldera. H.31 The cumulative impact of this project combined with the Telephone Flat project needs better analysis, since without Telephone Flat, there is no need to route any power lines through the Medicine Lake Caldera. H.32 The Telephone Flat Project is likely to receive tremendous opposition due to the much higher noise levels that would impact the receptors in the Medicine Lake Caldera. H.33

Winter activities can be expected to be more impacted by noise, since ambient noise levels are likely to be lower, making additional noise more apparent. A calm winter evening at Medicine Lake will measure about as low an ambient noise level as can be found outdoors, and it would be a shame to change that. H.34

Cumulative Impacts

While Fourmile Hill and Telephone Flat are separate projects, and will be analyzed separately, they are seemingly interdependent, particularly in regards to the Proposed Alternative, since the proposed alternative would not likely be selected without the Telephone Flat Project. H.35 If the transmission lines are kept out of the Medicine Lake Caldera, and the issue of snowmobile route and safety conflicts on 44N01 and 44N54 is resolved, the project would be acceptable, even though there would still be adverse noise, light pollution, and visual impacts. H.36 If the Telephone Flat Project must be added in to make Fourmile Hill more viable, we are opposed to both projects. I expect there will be considerable opposition to the Telephone Flat project from virtually everyone who enjoys Medicine Lake for what it is today, a beautiful pristine remote location without constant noise, light pollution, visual blight, and industrial conflicts with established recreation activities. H.37

Please keep us informed as the process proceeds, and keep us on your mailing list for the final EIS/EIR. Additionally, please make sure we are on the mailing list for the Telephone Flat project. H.38

Sincerely,

Bill Dart

Bill Dart,
District Legislative Officer.

cc Barry Jones, Winter Program Coordinator, OHMVR Division, State Parks
Ron Rawlings, President, California/Nevada Snowmobile Association
Adena Cook, Public Lands Director, Blue Ribbon Coalition
Carole Plank, President, Medicine Lake Homeowners Association

Letter I

September 30, 1997

Via Fax #(916) 233-5817

Mr. Randall M. Sharp
Fourmile Hill Geothermal Project EIS Coordinator
USFS/BLM
Modoc National Forest
800 West 12 Street
Alturas, CA 96101

RE: Comments of Draft Environmental Impact Statement

Dear Mr. Sharp,

CalEnergy Company Inc. supports the preferred alternative presented at the public hearings for the Fourmile Hill Geothermal Project provided that the selection of the northern transmission line route does not preclude CalEnergy from developing a transmission line to deliver power from the Telephone Flat Project. The location of the main transmission line corridor must be accessible to CalEnergy's Telephone Flat Project. The preferred alternative routes the transmission line corridor north of Mount Hoffman. Selection of this alternative, while avoiding conflicts with the recreational uses at Medicine Lake, will have a significant effect on the Telephone Flat Project's transmission line alternatives. It is CalEnergy's concern that the selection of the preferred alternative does not preclude CalEergy from gaining access to the transmission line corridor. The U.S. Forest Service has held from the beginning that there will be only one transmission line corridor from the highlands area. Calpine's proposed route in the Plan of Operations passed near the Telephone Flat project. The preferred alternative route is approximately 6 miles north of the project which will essentially limit the alternative routes available for the Telephone Flat project. The Record of Decision should recognize that the northern corridor is expected to service the entire KGRA. I.1

In addition to route selection, CalEnergy requests that the Record of Decision stipulate that the transmission line corridor have an open access policy which will allow both CalEnergy and Calpine to utilize the same corridor and possibly the same power transmission line. I.2

Sincerely,

CALENERGY INTERNATIONAL LTD.

Dale R. Schuster
Manager, Project Development

TFSharp930.doc.djd

CalEnergy International Ltd.
302 South 36 Street, Suite 400, Omaha, Nebraska 68131-3845 (402) 341-4500 Fax: (402) 345-9318

Letter J

California Native Plant Society
Shasta Chapter
Vivian Parker
Conservation Chairperson
P.O. Box 451
Manton, California 96059
Sept. 25, 1997

Randall Sharp USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th St.
Alturas, CA 96101

Dear Mr. Sharp,

Thank you for the opportunity to comment on the proposed Fourmile Hill Geothermal Development Project on the Medicine Lake Highlands.

The California Native Plant Society is opposed to this proposal for a number of reasons. We do not believe that the benefits to our society as a whole and to the subset of the local community is sufficient to merit the issuance of a permit which would irrevocably degrade an exquisite and unique element of our California heritage. J.1

We also believe that the analysis provided in the Draft EIR/EIS is not sufficient to address the botanical concerns which we have for this unique and pristine area, which are outlined below. J.2 We further recommend that this area be managed by the BLM and the US Forest Service for its natural, recreational, historical and cultural, as well as spiritual values, which benefit the greater public and represents the highest and best use of the area. Development of this area for geothermal power is a gross abuse of the public's trust, which would benefit a corporate industrial entity while ignoring the public's desire to maintain this area in its present natural condition. J.3

Six species of rare ("special status") plants were found to occur in the project area, with an additional fifteen species noted as probable inhabitants due to historical records in the vicinity and presence of potential habitat in the project area. This indicates a high level of rare plant diversity in an area which is not presently degraded by industrial development. We do not believe that simple avoidance mitigation is sufficient to adequately protect rare plant habitats. Most rare plants are rare because of their sensitivity to disturbances, in particular industrial development. There are often other factors involved besides simple mechanical loss of habitat. The pollination ecology, insect vectors, and other elements in the reproductive biology of these rare plants which could be potentially impacted by the development of this project, and associated changes in air quality and hydrology, are not even addressed. There is no evidence in this analysis that the ecology of any of these rare plants has been researched. What scientific evidence has been used to determine that the mitigation proposals will be adequate to ensure the viability of these rare plant populations? J.4

The State-listed endangered plant species Gratiola heterosepala, or Boggs Lake hedge hyssop, is known to occur within the geothermal area. Why was this J.5

1

species left out of this analysis? What mitigations are proposed to protect this rare plant?

The assessment of direct, indirect, and cumulative effects to rare plants in this document is also inadequate. There is no scientific data to assess the impacts of hydrogen sulfide emmissions on rare plant, fungi, lichen, or bryophyte populations. In addition, stating that "avoidance" of rare plant populations will be a sufficient mitigation for cumulative effects from the project, is inadequate and unscientific. Cumulative effects are the effects from loss of habitat which can occur from all phases of road, power plant, and transmission line construction, chemical and dust pollution which can result in the slow decline and eventual loss of plant populations, or the loss of pollination vectors, microclimate changes and subsequent habitat conversion, and weed invasion. Please provide scientific documentation for the rationale for determining direct, indirect, and cumulative effects for all of these species. J.6 J.7 J.8

Forest Service "Survey and Manage" species were inadequately dealt with in this document. The Forest Service is required to survey for Category 2 species for all projects which will be implemented after 1999. Extensive surveys to find high-priority sites for species management of Category 3 species was to be underway in 1996. No survey information is provided in this document. The EIR states that "survey protocols have not been developed" for accomplishing this fundamental work. Adequate management of late-seral habitat, identified in the President's Plan for management of forests in the range of the Northern Spotted Owl, cannot be accomplished until this information is collected. The Record of Decision for this management plan was signed in April, 1994. We do not believe that lack of a "survey protocol" is a sufficient excuse for not implementing this important element of the President's Plan. Survey protocols already in place for many years in the field of environmental impact analysis, such as those used to survey for rare plants, should be an adequate starting place for lichen, fungi, and bryophyte surveys. J.9

A survey of Table C-3 species in the ROD reveals that habitat exists for thirty-plus species of fungi, lichens, and bryophytes associated with late-seral lodgepole and red fir. The EIR states that only two fungi may occur in the area: Nivatogaster nubigenum and Gyromitra gigas. This is erroneous and there is no scientific documentation of how this determination was made. Habitat needs to be identified using sound scientific principles and an adequate survey needs to be undertaken by a trained mycologist, lichenologist, and bryologist in order to analyze the impacts to these species from this proposed project. J.10

Old-growth stands of red fir in the Medicine Lake Highlands are relicts of the vast stands of red fir which once existed in the area. These stands should have been inventoried for old-growth associated species as part of this NEPA process. In addition, research of lodgepole stands in the area revealed that even 6-7 inch diameter lodgepole were approximately seventy-five years old. This is an indication of the unique and fragile, as well as slow-growing, nature of the plant community. Recovery of these sites is likely to be slow, if at all possible. J.11

The EIR also states (pg. 4-93) that even if old-growth associated fungi and lichen species are impacted, these impacts would not be "considered J.12

significant." Considering that no surveying has been undertaken to determine the locations of these species, and that no information exists as to their health, viability, and distribution, by what criteria are you measuring these impacts, and what scientific data do you have to document that impacts will not be significant?

The section in the EIR (pg. 4-96) which deals with noxious weed invasions as a result of this project states that no weed inventory or management plan is in place at this time, and no surveying for noxious weeds has taken place to date. The assessment states that introduction of weeds into the Medicine Lake Highlands area would "not be considered a significant effect." What scientific research did you use to make this determination, and what was the criteria used to measure the impacts? J.13

Finally, plant enthusiasts visiting the Medicine Lake Highlands find that the views from Glass Mountain, Little Mt. Hoffman, and Mt. Hoffman are breathtaking, and this is primarily because these views are unobstructed by powerlines, power plants, and other aspects of industrial development. Implementation of this proposed geothermal project will result in the irreplaceable loss of a spiritually uplifting experience for many lovers of nature who come to this area because of its pristine beauty. There is no solution which can possibly mitigate this fundamental problem with the proposal. J.14

To conclude, the Shasta Chapter of the California Native Plant Society asks that you address all of these issues adequately, and we hope that you will decide in favor of the people and the plants, as well as the wildlife and other unique biological and geological elements of this special area, and make a decision to abandon this project. J.15

Sincerely,

Vivian Parker

Vivian Parker
Conservation Chairperson
Shasta Chapter
CNPS

California Wilderness Coalition

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Peppermint Alert
Placer County Conservation Task Force
Planning and Conservation League
Portervile Area Environmental Council
Range of Light Group, Toiyabe Ch., Sierra Club
Redwood Chapter, Sierra Club
Redwood Coast Law Center
The Red Mountain Association
The Rural Institute
Sacramento River Preservation Trust
San Diego Chapter, Sierra Club
San Fernando Valley Audubon Society
Save Our Ancient Forest Ecology
Sea and Sage Audubon Society
Seven Generations Land Trust
Sierra Club Legal Defense Fund
Sierra Nevada Alliance
Sierra Trails
South Fork Mountain Defense
South Fork Watershed Association
South Yuba River Citizen League
Tulare County Audubon Society
Tule River Conservancy
U.C. Davis Environmental Law Society
Ventana Wildlands Group
Western States Endurance Run
The Wilderness Society
Winiu Audubon Society
Yolo Environmental Resource Center

September 30, 1997

Randall Sharp
Project Coordinator
800 West 12th Street
Alturas, CA 96101

Subject: Fourmile Hill Geothermal Development Project EIS/EIR

Dear Mr. Sharp:

With habitat for northern spotted owl, goshawk, peregrine falcon, and pine marten, the Mount Hoffman Roadless Area, several important old growth groves, and one of the only year-round water sources in the region, the Medicine Lake Highlands is a critical source of connectivity between the Modoc plateau, Cascades, and Klamath-Siskiyou regions. As you know, the Highlands are also tremendously important to the Pit, Klamath, Shasta, and Modoc peoples. As a result, the protection and restoration of this unique landscape is a high priority for our organization. K.1

We have many grave concerns about the proposed Fourmile Hill Geothermal Development Project, as well as all of the other planned development projects in the Medicine Lake Highlands. We fear that the cumulative impact of these projects will be to leave the Highlands with all the habitat value and aesthetic appeal of an industrial park.

Unfortunately, we do not have time to focus on the innumerable flaws and biases in the EIS/EIR's analysis of water quality, Native American spiritual concerns, air quality, visual quality, etc. On the other hand, we trust our Native American and conservation friends will address these topics. As a result, we would like to incorporate by reference all of the comments on this project provided by the following organizations: K.2

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- Klamath Forest Alliance
- Sierra Club
- Wilderness Society
- Friends of the River
- Fall River Resource Conservation District
- Fall River Wild Trout Foundation
- Save Mount Shasta Association
- Pit River Nation (including all associated bands)
- Shasta Nation (including all associated bands)
- Klamath Nation (including all associated bands)
- Modoc Nation (including all associated bands)
- Seventh Generation Fund
- Medicine Lake Citizens for Quality Environment

Our own concerns are explained below.

Mount Hoffman Roadless Area

The Mount Hoffman Roadless Area is consistently referred to as a "roadless release area" in the EIS/EIR. We have been following roadless area development issues since the 1970s when the Forest Service first identified roadless areas through the first and second Roadless Area Review and Evaluation studies. In all that time, we have never encountered the term "roadless release area." The closest is the term "released roadless area" which is simply a way for the Forest Service to point out the fact that such roadless areas were "released" from wilderness consideration by the California Wilderness Act of 1984 until the next forest planning cycle. We have always considered this term somewhat insulting since it is designed to make roadless areas seem inconsequential. Thus, "roadless release area" is not only insulting to conservationists, but confusing as well since it has never, at least to our knowledge, been used before. The Modoc National Forest should know that the "release" clause of the California Wilderness Act of 1984 does not free the Forest Service from its obligation under the National Environmental Policy Act (NEPA) to consider the site-specific impacts of developing roadless areas and diminishing their primitive character (*Smith v. U.S. Forest Service*, F.3d, 9th Circuit Number 93-36187). K.3

As we informed the Forest Service in 1995 during the scoping process for the Glass Mountain Unit Geothermal Exploration Project EA/IS, K.4

much of this proposed powerline construction will occur in the Mount Hoffman Roadless Area. We further informed the Forest Service that the impacts of the proposed action on the roadless area must be assessed in an EIS. Unfortunately, our concerns were ignored in the EIS/EIR since the description of the Mount Hoffman Roadless Area contained in the EIS/EIR on pages 3-140-3-141, as well as the discussion of the project's impacts on the roadless area on pages 4-198-4-200, fail to discuss the Forest Service's roadless area evaluation criteria, namely natural integrity, apparent naturalness, remoteness, solitude, special features, managability, logical boundaries, and special places or values. We are surprised that these issues were ignored since the Modoc National Forest has complied with the laws and policies covering roadless areas in the past by considering the impacts of projects on these values. See, for example, the Mount Vida Planning Area Final Environmental Impact Statement, Modoc National Forest, July, 1991.

The assessment of the geothermal project's impact on the Mount Hoffman Roadless Area contained in the EIS/EIR would be humorous did it not violate the National Environmental Policy Act so profoundly. For example, the EIS/EIR's "assessment" of the project's negative impact on recreation in the roadless area consists of a mere reminder that hikers and others can go elsewhere if their recreational experience is degraded by powerlines and roads (EIS/EIR, page 4-198). We are dismayed that the Forest Service would substitute such insulting and indefensible arguments for a legitimate analysis on recreational impacts. K.5

On the same page, the EIS/EIR mentions that off-road vehicles may be allowed to use the powerline corridor without even bothering to assess the ecological, cultural, recreational, and other impacts of allowing such motorized use in a roadless area. Apparently, the Modoc National Forest is oblivious to the fact that off-road vehicle use in roadless areas is terribly controversial and has itself been the subject of numerous environmental impact statements, appeals, and court battles in Forest Service Region 5. K.6 Lastly, page 4-200 offers an analysis that is both myopic and misleading. For example, the EIS/EIR ignores the fact that the Mount Hoffman Roadless Area will be cut in half by the powerline and road project, and simply asserts that only 24 acres (0.2 percent of the roadless area) will be affected. This analogous to asserting that a gunshot victim is not seriously injured since the hole K.7

in his body is only quarter-inch wide and occupies only a small percentage of his body as a whole.

It is important to note that, in the past, the Modoc National Forest (as well as other national forests) have prepared far more defensible and thorough environmental impact statements for projects destroying similar amounts of roadless acreage. For example, the Mount Vida EIS referenced above provided an extensive discussion of roadless area values for a proposal to construct one mile of road through the Mount Vida Roadless Area. Like the Fourmile Hill project, the Mount Vida road project would have cut the roadless area in half and affected "only" 55 acres (0.6 percent of the Mount Vida Roadless Area). Despite this, the Forest Service made an effort to assess the impacts of the proposed road on the Mount Vida Roadless Area's natural integrity, apparent naturalness, remoteness, solitude, special features, managability, logical boundaries, and special places or values. It seems that the Modoc has decided to give NEPA short shrift for the Fourmile Hill project.

As a result, the EIS/EIR violates 42 U.S.C. subsection 4321-4370 (NEPA) which requires that environmental impact statements examine the impact of major federal actions that may significantly affect the quality of our environment. More specifically, "The decision to develop a previously undeveloped area is an irreversible and irretrievable decision, the impacts of which must be analyzed in an EIS" (California v. Block, 690 F.2d 753, Ninth Circuit, 1982). The Forest Service has an obligation under NEPA to consider the site-specific impacts of developing roadless areas and diminishing their primitive character (Smith v. U.S. Forest Service, F.3d, 9th Circuit Number 93-36187). K.8

The Mount Hoffman Roadless Area is over 5,000 acres in size and remains primitive in character. Thus, it qualifies as a future addition to the National Wilderness Preservation System according to the criteria established by the Wilderness Act of 1964. As the courts have affirmed, "[t]he possibility of future wilderness classification triggers, at the very least, an obligation on the part of the agency to disclose the fact that development will effect a 5,000 acre roadless area" (Smith v. U.S. Forest Service, supra, slip op. at 9489). In addition, the Forest Service Handbook states that if a "substantial alteration" of a roadless area's primitive character is proposed, an EIS must be prepared and impact of the proposed action on the roadless area must be

considered (1909.15 Section 20.6 WO Amendment 1909.15-92-1). This direction is no mere paperwork exercise—it recognizes the ecological importance of these areas and the inherently controversial nature of development projects proposed in them.

The arguments mentioned above regarding NEPA and proper roadless area analyses have been affirmed numerous times by both the Forest Service through the administrative appeals process, as well as by the courts (see Appeal to the Regional Forester for Region 4 of the United States Forest Service of the DN for the Woodfords Timber Sale in the Toiyabe National Forest by the California Wilderness Coalition, the Wilderness Society, and Sorensen's Resort, August 25, 1994).

As the foregoing discussion demonstrates, the effect of the proposed action on the wild character of the Mount Hoffman Roadless Area was improperly studied in the EIS/EIR (or more precisely, not studied at all). Thus, the EIS/EIR does not satisfy the detailed analysis requirements set forth in 36 C.F.R. § 219.17.

Compliance with President Clinton's Northwest Forest Plan

The Medicine Lake Highlands are the only portion of the Modoc National Forest covered by President Clinton's Northwest Forest Plan (hereafter referred to as Option 9). Unfortunately, we suspect that most of Option 9's standards and guidelines have not even been considered as part of this project given their scant coverage in the EIS/EIR.

We request that the final EIS specifically explain how each of the following requirements of Option 9 will be met (all citations are from the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, USDA USFS, USDI BLM, April, 1994): K.9

- A watershed analysis must be completed before *any* management activities are carried out in roadless areas (p. B-19).

- A watershed analysis must be performed before interim riparian reserves may be entered for management activities, regardless of the type of activity proposed (pp. C-31-C-32).

- Riparian reserves must be defined as "any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition" (p. C-31). Seeps and springs must be classified as streams if they have sufficient flow in a channel, or if they qualify as seasonal or perennial wetlands under the criteria defined in the 1987 Corps of Engineers Wetlands Manual (p. B-16).

- All unstable and potentially unstable areas must be included in riparian reserves (p. C-31). This includes all areas characterized by steep slopes and soft, underlying bedrock (pp. B-23-B-26). K.10

- Riparian reserve widths must be measured according to the height of sight-potential trees (p. C-31).

- Riparian reserves must contain adequate dispersal habitat for terrestrial species such as the northern spotted owl (p. B-31).

- No cutting of late-successional forest is allowed in watersheds where 15 percent or less of the federal forest land is late-successional forest (p. C-44-C-45). K.11

- Surveys to protocol must be conducted for "survey and manage" species (S&G, p. C-4-5 and p. C-49-61, Table C-3). K.12

- Green tree and snag retention guidelines must be met (p. C-41-C-42).

- Any course woody debris on the ground must be retained and protected to the greatest extent possible (p. C-40). K.13

Lastly, it is important to consider that roadless areas and ancient forests are rare in the Modoc. We believe such wild, irreplaceable places are far too important to be subjected to geothermal development—or any other kind of destructive development. We believe that every effort should be made to preserve these wildlands for future generations. For this reason, we strongly support Alternative 7 as described in the EIS/EIR. We encourage the Forest Service and Bureau of Land Management to select Alternative 7 as the preferred alternative in the final version of the EIS/EIR. K.14

Thank you for considering our comments. Please mail us a copy of the final version of the EIS/EIR when it is completed. K.15

Sincerely,

Ryan Henson
Conservation Director

DESERT SURVIVORS

Letter L

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

RE: Fourmile Hill/Telephone Flat Projects

Mr. Sharp:

September 15, 1997

Desert Survivors opposes the large geothermal development slated for the Medicine Lake Highlands by the power companies, "CalEnergy" and "CalPine". L.1

The Medicine Lake Highlands is a unique natural area that provides significant habitat to many species of birds and animals, most of which are not common in our state. Specifically, the Northern and California Spotted Owls, American Marten, Goshawk, Pileated Woodpecker, Bald Eagle, Osprey and Peregrine Falcon all would be adversely affected. Two roadless areas, Mount Hoffman and Burnt Lava Flow, provide good habitat for these species. We need to protect wildlife habitat, which is rapidly disappearing in our state. L.2

Significant forest resources would be damaged by this project, and the forest as a viable life community would be jeopardized. We need to protect our forests from damage. Forests like these protect biodiversity. In addition, we must retain beautiful, spirit-sustaining places to enjoy and rever. L.3

This area is also sacred to four native tribes in the region, the Pit, Klamath, Modoc and Shasta Tribes. Powerplants feeding off the geothermal resources that are the basis of the Highlands' sanctity would be a sacrilege. L.4

I should also point out that geothermal drilling and exploitation is well known for drawing down water tables by depleting the water supply where they are installed. These types of facilities can also pollute aquifers by allowing migration of toxic hot water from one place to another and from the subsurface to the surface. It would be a great tragedy if this happened in this outstanding natural area. L.5

Please put me on the mailing list for all future actions concerning this geothermal project, the two roadless areas mentioned above, and the Medicine Lake Highlands area generally. L.6

Sincerely,

Steve Tabor, President
Desert Survivors
P.O. Box 20991
Oakland, CA 94620-0991

(510) 769-1706

e-mail: StevTabor@AOL.com

cc: Senator Dianne Feinstein
Senator Barbara Boxer

FALL RIVER RESOURCE CONSERVATION DISTRICT
PO Box 83
McArthur, CA 96056

August 4, 1997

TO: Randy Sharp
USFS
Project Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp;

The Fall River Resource Conservation District (FR RCD) in cooperation with Dr. Thomas Grose and Maria Ellis would like to comment on the draft EIS/EIR that was recently issued for the Fourmile Hill Geothermal Proposal.

Dr. Grose informed the FR RCD that the document was available. Unfortunately, no copy has been sent to the FR RCD. Additional copies are apparently unavailable. The FR RCD had understood that our specific request to Randy Sharp to be included on all future mailings for any geothermal issues would include receipt of this important document. Furthermore, the FR RCD provided written comments of concern in a letter dated Dec. 4, 1996. Not only were these concerns ignored in the EIS/EIR document, but the effort to present these concerns did not even warrant inclusion on the mailing list. (Reference EIS Document Table of Concerns Raised During Public Scoping Period) Fortunately, a copy was located and a review was possible. M.1

As the USFS project coordinator for this proposal, it is your responsibility to see that all legitimate concerns of the public are addressed in the environmental review documentation. The failure of this document to address (or even acknowledge) these concerns is unacceptable. Our comments were based on many hours of consultation with some of the leading geologists in the nation. These experts are well versed in geothermal development, and the concerns raised during these discussions are based on sound scientific evidence of a potential connection of the Medicine Lake Highlands to the source spring areas for the Fall River. Our primary concern remains that not enough is known about this inter-connection to safely proceed with geothermal development. The failure of the EIS/EIR to address that concern is apparent. M.2

Of further concern has been the resistance of the USFS, BLM, Weiss and Associates, Bonneville Power and other to aggressively pursue existing proposals by Lawrence Livermore Laboratories to research this inter-connection through isotopic testing, helping us to better assess the risks. Do the guardians of our public resources feel that this study would pose unacceptable delays to this project? Does the value of the pristine spring systems feeding Fall River or the value of the threatened and endangered species in those springs warrant such a study?

Below are listed our specific comments and concerns on the Draft EIS/EIR for the Fourmile Hill Project. We continue to hope that these concerns will be taken seriously and we intend to follow whatever course is necessary to insure that our resources are not put at risk.

1) The critical subject of regional hydrogeologic setting of the Four-mile Hill prospect area is simply not discussed. Mention is made of the Fall River Springs, but dismissed on basis of perceived, but not substantiated, groundwater flow directions being away from the springs, etc. Powerful evidence indicates that basically the regional gradient is southward. There is no discussion at all of this probability. M.3

2) Drainage basins as supposed in the EIS are simply based on weak topography. The deeper systems at least would be forced to flow (in significant part) southward along the base of the ML volcano, and to escape at the low point or subsurface spill point along the south margin of the volcano edifice, and from there to the Fall River Springs. (I site these interpretations as examples of what is likely to be true; the EIS ignores or doesn't understand these likely hydrogeologic conditions. Field data are required to resolve these problems.) M.4

3) The supposed volcano-wide clay-rich ash-flow tuff that is presumed to act as a caprock to the geothermal system is an interpretation without substantiation, unless all the proprietary well data support it. But the reader has no way of checking it. (See Fig.3.4-2 and Fig.3.4-3). Basaltic shield volcanoes are not known for such layers anywhere, at least of the magnitude assumed for this prospect. M.5

4) It is assumed that a deep hot water zone is neatly isolated from a shallow cold water zone, by this assumed widespread insulating thick layer. Geologic and geophysical evidence, i.e, modern faulting, seismicity, etc., of the volcano behavior says otherwise. Again, the subject is not discussed; it should be. M.6

5) The reader of the EIS, trying to understand it, is handicapped since much of the required credible substance is shrouded in the realm of well data stated to be proprietary. The physical geology of the geothermal system is unknown, but is presented as speculation, assumption, unsupported (at least in the EIS) interpretation, and incorrect analogy. Inconsistencies and omissions occur. M.7

6) Most serious, the basic question of how geothermal activities anywhere on the Medicine Lake volcano may affect the Fall River Springs system is not addressed. What is the level of risk to the Springs? And why? If we do not know, M.8

what do we do to find out? Known geologic evidence firmly supports some risk. Risk must be evaluated, not dismissed on the basis of one or two suppositions as the EIS does.

7) Most disturbing is the fact that the above concerns and many other just-as-important related concerns have already been expressed and presented in writing in timely fashion through proper channels in the environmental review process for inclusion in the Draft EIS - and they were not included in the Draft EIS. I am refering to three letters: 1) letter to Randy Sharp from FR RCD, Grose, and Ellis dated Dec. 4, 1996, 2) letter to Randy Sharp from Peter Stent, Feb. 10,1997, and 3) letter to Randy Sharp from FR RCD, Feb.18,1997. M.9

8) The USGS hydrogeologists have undertaken a study to determine the chemical and other similarities of the Fall River Springs to the Medicine Lake Highland source area. The data that this study produces should also be considered in the Final EIS/EIR document. M.10

Unless the foregoing concerns are explicitly addressed in a rigorous, thorough, and scientific manner, we believe that the Draft EIS/EIR will be incomplete and will not satisfy the many laws which have required its preparation. We suggest that a comprehensive analysis of the foregoing is mandated under the law and request that such an analysis be considered within the final EIS/EIR before any permits are issued. M.11

Rick Poore
Director, Fall River Resource Conservation District

Dr. Thomas Grose
Geologist, Colorado School of Mines

Maria Ellis
Shasta Crayfish Biologist
Doctoral Candidate
University of Michigan

Letter N

FALL RIVER WILD TROUT FOUNDATION
39863 McArthur ROAD
FALL RIVER MILLS, CA 96028

Mr. Randall Sharp, USFS/BLM September 25, 1997
EIR/EIS Coordinator
Fourmile Hill Geothermal Development Project
800 W. 12th Street
Alturas, CA 96101

Re: Fourmile Hill Geothermal Development Project; Draft Environmental Impact Statement/Environmental Impact Report; Comments by Fall River Wild Trout Foundation to Draft EIS/EIR

Dear Mr. Sharp:

We have reviewed the Draft EIS/EIR for the proposed Fourmile Hill Geothermal Development Project. The following are the comments of the Fall River Wild Trout Foundation:

The Proposed Project

1. Calpine Corporation submitted a Plan of Utilization to the U.S. Bureau of Land Management and the U.S. Forest Service to develop a 49.9 megawatt (MW) geothermal power plant and wellfield and 24 mile, 230- kilowatt transmission line. This project, known as the Fourmile Hill Geothermal Development Project, would be located in the Glass Mountain Known Geothermal Resource Area on the Klamath and Modoc National Forests, in Siskiyou and Modoc counties, California. The purpose of the Fourmile Hill Geothermal Project is to develop the geothermal resource on Calpine's federal geothermal leases in order to economically produce and deliver electrical energy to the Bonneville Power Administration.

The proposed would involve production of geothermal fluids (hot water and steam, and associated toxic and non-toxic elements) from a claimed underground reservoir. These fluids would be produced from 9 to 11 two-phase production wells located at five proposed production well pad sites. The fluids would be transported via surface pipelines to the proposed dual flash geothermal power plant, where the steam would be directed to two steam turbine-driven generators. Spent brine and condensate would be pumped through surface pipelines to the three proposed injection well pads for injection to the subsurface claimed geothermal reservoir. There would be one injection well located at each injection well pad. N.1

Each of the production and injection well pads would occupy approximately 2.5 acres, for a total well pad area of 20 acres. The power plant site would occupy approximately 3.0 acres. There would be a total of 4.25 miles of surface pipelines (1.5 miles of production lines, and 2.75 miles of injection lines) and about 2.5 miles of new roads associated with the power plant and well pads.

The proposed project would also include development of a transmission line that would extend from the proposed geothermal plant in an easterly direction for approximately 24 miles to a proposed intertie station along the BPA Malin-Warner transmission line. The Malin-Warner line is a 230-kV system that parallels Highway 139. The proposed transmission line would be constructed using H-frame wood poles with steel structures used at certain locations. The transmission line would be located primarily on the Modoc National Forest, with a small portion of the line near the power plant site being located on the Klamath National Forest. Right-of-way width would be approximately 125 feet along the constructed length of the transmission line. Construction of access roads for installation and maintenance would be required along portions of the right-of-way.

Decision Making Authority

2. The BLM has decision-making authority on all geothermal activities proposed to be conducted on federal lands, and therefore serve as a lead federal agency for the proposed project. However, because the proposed project includes a proposed transmission line corridor that crosses National Forest lands, the U.S. Forest Service will also serve as a lead federal agency for the proposed project.

We reference Background Information on Proposed and Past Geothermal Activities within the Glass Mountain KGRA; U.S. Bureau of Reclamation, Modoc National Forest, and Klamath National Forest; June 7, 1996.

Duties and Responsibilities by the U.S. Bureau of Land Management and the U.S. Forest Service Under the Federal National Environmental Policy Act

3. The proposed project is highly controversial in the local and regional areas because of the adverse environmental and social impacts which cannot be mitigated or are being unreasonably mitigated in the DEIS/EIR. Pursuant to Section 102(2)(c) and other requirements of the federal National Environmental Policy Act (NEPA) the U.S. Bureau of Land Management and the U.S. Forest Service have duties and responsibilities as lead federal agencies to assure the public that the Draft and Final EIS/EIR is in full compliance with NEPA and its requirements.

Duties and Responsibilities by the Siskiyou County Air Pollution Control District Under the California Environmental Quality Act and its Guidelines

4. The proposed project would require permits from the Siskiyou County Air Pollution Control District. The Siskiyou County Air Pollution Control District will serve as the lead agency under the California Environmental Quality Act and its Guidelines. The Siskiyou County Air Pollution Control District has a duty and responsibility as the lead state agency to assure the public that the Draft and Final EIS/EIR are in full compliance with CEQA and its Guidelines.

Conflict of Interest

5. It is the view of the FRWTF that there is a conflict of interest associated with the approval of the proposed project by the U.S. Bureau of Land Management and the U.S. Forest Service. The federal government stands to gain 15 to 25 million dollars in royalty payments over the first 20 years of the proposed project. Consequently, this 15 to 25 million dollar windfall to the federal government gives the U.S. Bureau of Land Management and the U.S. Forest Service, the decision makers, the motivation and incentive to approve the proposed project regardless of the environmental impacts and also "unavoidable impacts" to a major high profile native american worshipping area (Medicine Lake Highlands Area). N.2

We reference the Draft EIS/EIR for the Fourmile Geothermal Development Project; July 1997; at page 2-59 under Economic Benefits.

The Klamath National Forest Land Resource Management Plan and the Modoc National Forest Land Resource Management Plan

6. The executive summary states that the Klamath and Modoc National Forests will also decide whether to amend the forest Land Resource Management Plans to establish and designate a utility corridor for the proposed project's transmission line and issue forest orders to prohibit the use of firearms in the immediate power plant and wellfield area. We reference Executive Summary at page S-3 of the Fourmile Hill Geothermal Project DEIS/EIR.

According to the Executive Summary, the authorization of the proposed action (project) will require that the U.S. Forest Service make certain amendments to the Klamath and Modoc National Forest Land Resources Management Plans in order to ensure consistency of the proposed action (project) with the Plans. Both Plans would be amended to establish and designate a utility corridor for the transmission line for the proposed Fourmile Hill plant site to the Bonneville Power Authority Malin-Warner transmission line. N.3

National Forest Land Resource Management Plans throughout California took many years to be developed and approved because of public controversy. Those Plans were developed in accordance with NEPA and its requirements with full public disclosure based on scientific studies, subject to appeals. Consequently, the Klamath National Forest and the Modoc National Forest should prepare separate EIS's for the proposed amendments to their forest land resource management plans to accommodate the proposed project and future projects. The recommended EIS's should disclose, evaluate, and mitigate the following issues with full public disclosure:

(a) The potential direct, indirect, and cumulative impacts to threatened and endangered species and their habitat (all life stages) resulting from the proposed transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(b) The potential direct, indirect, and cumulative impacts to spotted owl species and their habitat (all life stages) resulting from the proposed transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(c) The potential direct, indirect, and cumulative impacts to other special status species and their habitat (all life stages) resulting from the proposed transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(d) The potential direct, indirect, and cumulative impacts to Research and Natural Areas resulting from the proposed transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(e) The potential direct, indirect, and cumulative impacts to Backcountry Management Areas, including the cumulative impacts from other transmission corridors that have been approved;

(f) The potential direct, indirect, and cumulative impacts to Special Interest Areas, including the cumulative impacts from other transmission corridors that have been approved;

(g) The potential direct, indirect, and cumulative impacts to areas used in the practice of American Indian religions, including the cumulative impacts from other transmission corridors that have been approved;

(h) The potential direct, indirect, and cumulative impacts to forest trees, riparian habitat and plants caused by fires resulting from transmission line caused fires, including the

cumulative impacts from other transmission corridors that have been approved;

(i) The potential direct, indirect, and cumulative impacts to water quality resulting from land disturbance activities and erosion caused by the construction and maintenance of the project's transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(j) The potential direct, indirect, and cumulative impacts to fishery resources and their habitat (all life stages) resulting from land disturbance and erosion caused by the construction and maintenance of the project's transmission corridor, including the cumulative impacts from other transmission corridors that have been approved;

(k) The potential direct, indirect, and cumulative impacts to the public (users) resulting from noise activities associated with the proposed project and future projects;

(l) The potential direct, indirect, and cumulative impacts to visual resources as a result of the transmission corridor, the proposed plant and associated project works, and future projects, including other the cumulative impacts from other geo and/or hydro projects;

(m) All the evaluations and studies associated with the above should be based on all new available information and data.

The DEIS/EIR for the proposed project is not an adequate NEPA document to be used by the U.S. Forest Service to amend the forest land resource management plans and approve standards and guidelines for the management of the Klamath and Modoc National Forests. This DEIS/EIR for the proposed project is for the proposed project and not for the management of the entire forests.

The DEIS/EIR for the proposed project is premature because the land resource management plans for the Klamath and Modoc National Forests must be amended prior to the U.S. Bureau of Land Management approves the proposed project; and before the U.S. Bureau of Land Management and the U.S. Forest Service's approval of the draft and final EIS/EIR for the proposed project. Consequently the DEIS/EIR is not sufficient and adequate to amend the Land Resource Management Plans for the Klamath and Modoc National Forests. We are requesting that separate EIS's are prepared by the U.S. Forest Service for the amendments to the management plans for both forests. And because the EIS for the proposed project would not be in compliance and consistent with the standards and guidelines in the land resource management plans for both forests, that the U.S. Forest Service is compelled to deny the approval of

the transmission corridor and select the no project alternative.

Hydrology - Groundwater, Surface Flows, Subsurface Flows and Springs

7. The hydrology information and data in the DEIS/EIR is grossly deficient and failed to provide scientific evidence as a result of documented supporting studies that the proposed project will not directly, indirectly, and cumulatively affect groundwater, surface flows, and subsurface flows, and numerous spring water sources.

To show that the hydrology analysis in the DEIS/EIR is grossly deficient, Mr. Phil Woodward, a professional expert, stated the following to the U.S. Forest Service:

"Current knowledge of the hydrology in the area, both groundwater and surface water is limited. The extent of the limited knowledge is apparent in any discussion in the text where a description of the hydrology is found. For example, page 3-21, paragraph 4 reads in part; "Date **suggest** that regional groundwater flow...". "...Shallow groundwater within the caldera appears to flow towards the center at a very shallow gradient, and **probably** discharges at...". It is **assumed** that through the surface flow..." (emphasis added) And the fourth paragraph on page 3-41 summarizing the relationship of surface water, groundwater, and geothermal system has similar qualifiers in every sentence. Figure 3.4-2, a Schematic Cross Section of Medicine Lake Area has numerous question marks indicating unknown areas which are critical to understanding fluid movement in and around the geothermal source and the relationship with shallow groundwater and surface water. In short, no one knows what is happening with the hydrology in the area." (Our Emphasis) N.4

It is clear that the hydrology information in the DEIS/EIR is grossly deficient, without merit, and is not supported by any qualified studies.

Mr. Woodward further stated that:

"Groundwater and surface water flow in the Medicine Lake Highlands is indeed controlled by the highly fractured basaltic formations as described in the EIS/EIR. However, cavernous flow is also a controlling factor and one not discussed in the document. Lava tubes are common in the Medicine Lake Highlands, including one known tube system over 20 miles in length. Groundwater flow through such conduits results in surface effects similar to those found at Big Springs below McCloud, and the springs which supply the Fall River, Big Lake and Horr Pond in the Fall River Valley. The effects of the geothermal operation on subsurface flows and

their interaction with surface waters are unknown." (Emphasis Added)

We reference letter of September 12, 1997 to Randall Sharp, USFS/BLM; Fourmile Hill Geothermal Development Project; EIS/EIR Coordinator; from Phil Woodward, Registered Geologist; Certified Engineering Geologist; Certified Hydrogeologist.

As stated beforehand, it is very clear the hydrology analysis in the DEIS/EIR is grossly deficient and totally incomplete for the U.S. Bureau of Land Management and the U.S. Forest Service to consider making any decision on approving the proposed project.

The DEIS/EIR Failed to Disclose, Evaluate, and Mitigate the Potential Adverse Direct, Indirect, and Cumulative Impacts to Plants and Animals Resulting From Geothermal Fluids as a Result of the Proposed Project

8. Mr. Woodward further stated that:

"No chemical data is presented on geothermal fluids produced from wells in the area. The report states that the "...data from these wells are proprietary...". Without chemical information, no clear evaluation of the geothermal system and fluid chemistry can be made. It is possible the geothermal fluids produced could be harmful to plant and animal life in the area due to high concentrations of heavy metals such as arsenic, cadmium, lead, mercury. etc. The preparers of the report are remiss in not including the chemical information. Not all chemical information on the geothermal fluids is proprietary. The Regional Water Quality Control Board, Central Valley Region sampled geothermal fluids produced from wells 68-8 and 31-17 (formerly 21-17). That information is in the public domain and is available to anyone on request." N.5

We reference letter of September 12, 1997 to Randall Sharp, USFS/BLM; Fourmile Hill Geothermal Development Project; EIS/EIR Coordinator; from Phil Woodward, Registered Geologist; Certified Engineering Geologist; Certified Hydrogeologist.

The DEIS/EIR is deficient without the geothermal fluid information and data as cited above. The DEIS/EIR also failed to disclose, evaluate, and mitigate the potential direct, indirect, and cumulative impacts to plant and animal life (all life stages) resulting from geothermal fluids from the proposed project.

Hydrology - Fall River Watershed - Cumulative Impacts Not Disclosed and Evaluated Resulting From the Fourmile Hill Geothermal Development Project and the Telephone Flat Geothermal Project

9. The DEIS/EIR is deficient because it did not disclose, evaluate, and mitigate the cumulative impacts to the human environment resulting from the proposed Fourmile Hill Development Project and the proposed Telephone Flat Geothermal Project. The U.S. Forest Service and the U.S. Bureau of Land Management are piece mealing two projects. NEPA requires that cumulative impacts are disclosed and evaluated. N.6

The Fall River Resource Conservation District (FRRCD) advised the USFS/USBLM EIS/EIR Coordinator for the proposed Telephone Flat Geothermal Project that during the past several months, Dr. Thomas Grose, Geologist with the Colorado School of Mines, had collected data and produced the basic geologic mapping of the Fall River Valley and surrounding area for use by the FRRCD in planning efforts and water development. After consultation with Dr., Grose, the FRRCD has been advised of the probable link from the Medicine Lake Highlands to the headwaters springs of Fall River.

The FRRCD further advised the USFS/USBLM Coordinator that given the unique and invaluable nature of this spring system and the community it supports, the likelihood of geologic connection to the project area, and the danger of potential impacts from disturbance by geothermal development, the FRRCD provided site specific comments such as it is probable that most of the water issuing from the headwater springs of the Fall River is water from the Medicine Lake Highlands. And that this conclusion is supported by work done by the Lawrence Livermore Lab, the U.S. Geological Survey, and Dr. Thomas Grose. N.7

The FRRCD went on to advise the Coordinator that the risk of perturbation or contamination of the source area constitutes a threat to the integrity of Fall River and its spring system and to aquatic species dependent upon the constant flow, clarity, water chemistry, and temperature of the spring environment.

We reference letter of June 4, 1997 to Randy Sharp, USFS, Coordinator, from Fall River Resource Conservation District.

As stated beforehand, the hydrology information and data in the DEIS/EIR is grossly deficient and failed to provide scientific evidence as a result of supporting studies that the proposed Fourmile Hill Geothermal Project and the proposed Telephone Flat Geothermal Project will not have cumulative effects to the surface and subsurface (underflow) N.8

flows of the Fall River Watershed, and any other spring sources. It is our understanding the hydrologic system controlling the Fall River springs is extremely sensitive to any perturbation in the greater region influencing the springs and that the alteration to the groundwater regime in the summit area of Medicine Lake Volcano will negatively impact the Fall River springs.

The DEIS/EIR failed to disclose and evaluate the direct, indirect, and cumulative impacts to the Fall River springs and other spring sources as a result of the proposed project.

The DEIS/EIR did not disclose and evaluate with careful evaluation via professional verification whether the proposed Fourmile Hill Geothermal Project and the proposed Telephone Flat Geothermal Project will have cumulative impacts to the natural Fall River springs and other natural spring sources.

Fall River Wild Trout Fishery

10. The DEIS/EIR failed to disclose and evaluate the potential direct, indirect, and cumulative impacts to water quality and the effects to wild trout species and their habitat (all life stages) and aquatic species and their habitat (all life stages) of Fall River as a result of the proposed Fourmile Hill Geothermal Project and the Telephone Flat Geothermal Project. Consequently, the DEIS/EIR is deficient for failing to disclose and evaluate the potential direct, indirect, and cumulative impacts to water quality and the effects to the wild trout species and their habitat (all life stages) and aquatic species and their habitat in Fall River as a result of the proposed projects.

The failure of the DEIS/EIR to disclose and evaluate the direct, indirect, and cumulative impacts to water quality of Fall River resulting from the proposed projects because of potential adverse water quality alterations and impacts also failed to disclose and evaluate the potential direct, indirect, and cumulative impacts to Shasta Crayfish species and their habitat (all life stages) in Fall River. The Shasta Crayfish is protected under the federal Endangered Species Act. The DEIS/EIR is deficient for failing to disclose and evaluate the direct, indirect, and cumulative impacts to Shasta Crayfish species and their habitat of the Fall River as a result of affecting Fall River springs as a result of the proposed project and future geothermal projects. N.9

The cumulative impacts to several other unique and rare species and their habitat in Fall River resulting from the proposed Fourmile Hill Geothermal Project and the Telephone Flat Geothermal Project were not disclosed and evaluated in the DEIS/EIR. Those species and their habitat are: rough sculpin (federal species of concern and state-listed

threatened species), bigeye marbled sculpin (California species of special concern), California floater mussel (federal species of concern) and montane peaclam (federal species of concern).

Water Rights Permit

11. Without a proper and justifiable detailed hydrology analysis in the DEIS/EIR, based on the information and data in the DEIS/EIR, it is impossible for the public, U.S. Forest Service, and the BLM to determine whether or not the proposed project will affect the surface flows and the subsurface (underflow) flows of Fall River Springs and other surface and subsurface and spring sources. At least one professional source states that it will affect Fall River Springs [Thomas L.T. Grose, Geologist].

In the event it is determine by study or other means, that the proposed project will affect the surface and/or subsurface (underflow) flows of Fall River Springs and/or any other surface and subsurface flows, state law (California Water Code) requires Calpine, the applicant, to obtain a conditioned water right permit from the California State Water Resources Control Board to divert and use the state's surface and subsurface (underflow) flows for the proposed project.

Consequently, the U.S. Forest Service must conduct a detailed hydrology analysis to determine whether or not the proposed project will have any affect to the Fall River Springs and other surface and subsurface flow sources. That detailed hydrology analysis must be included in any supplemental DEIS/EIR prepared by the U.S. Forest Service for the proposed project. N.10

Water Rights Holders

12. In the event the proposed project affects the surface and/or subsurface (underflow) flows of Fall River Springs or any other surface and subsurface flow sources, that effect has the potential to injury legal water right holders who may divert, store, and use the state's water for beneficial uses.

Consequently, all legal water right holders should be advised by the U.S. Forest Service that a potential exist that may affect their water rights and water supplies.

Native American Cultural Resources

13. The proposed project is considered by local tribes of Native Americans to have a significant adverse effect on Medicine Lake Highlands. The Medicine Lakes Highland is a Native American sacred area of worship and is considered N.11

higher in priority of worship than Mt. Shasta. The proposed project would conflict with established religious use of the Medicine Lake Highlands and would introduce adverse visual and audible impacts that are totally out of character with the use of the area for established religious uses and activities. The proposed project would invade and interfere with religious practices of Native American tribes.

The DEIS/EIR considers the effects at significant. However, the DEIS/EIR claims that the levels of significance after mitigation is "unavoidable". It is clear to avoid the significant impacts to established religious uses and activities in the Medicine Lake Highlands area that the No Project Alternative should be selected by the U.S. Forest Service.

The DEIS/EIR did not disclose, evaluate, and mitigate the cumulative impacts to established religious uses of traditional cultural values of both the Klamath and Modoc National Forests resulting from the proposed project and other existing projects, and future projects. NEPA requires that cumulative impacts are disclosed and evaluated. The DEIS/EIR is deficient without this information and evaluation. N.12

Stream Crossing - Transmission Corridor

14. The DEIS/EIR is deficient because it failed to disclose and evaluate the direct, indirect, and cumulative impacts to fishery resources, riparian habitat, and water quality as a result of the stream crossing associated with the construction of the transmission corridor. The DEIS/EIR did not disclose the names of the streams where the stream crossings will be made nor did the DEIS/EIR disclose the present conditions of fishery resources, riparian habitat, and water quality in the streams to be affected by the stream crossing for the proposed transmission corridor. The DEIS/EIR simply stated that the applicant will obtain a streambed alteration agreement from the California Department of Fish and Game. Streambed alteration agreements are not subject to CEQA and is an agreement between the DFG and applicants without any public notification and input. N.13

Water Quantity and Water Quality Mitigation Measures Deficient

15. As stated beforehand, the hydrology analysis in the DEIS/EIR is grossly deficient. The DEIS/EIR on page 4-26 under Mitigation Measures for water quality is deficient. The mitigation measures were not based on the results of scientific studies. The recommended mitigation measures in the DEIS/EIR are "after the fact", without supporting scientific studies, and follow the approval of the project. N.14

The DEIS/EIR suggest that Calpine shall submit for approval by the USFS and BLM a hydrologic monitoring plan for the caldera and a defined local area. The Hydrologic Monitoring Plan for the caldera and the area should have been included in the DEIS/EIR. The DEIS/EIR is deficient without the Hydrologic Monitoring Plan and the scientific studies and reasoning which led to all of the elements in the Plan.

The collection of baseline water level and water quality information and data should have been included in the DEIS/EIR. The DEIS/EIR is deficient without this information and data. As stated beforehand, the hydrology information and data in the DEIS/EIR is deficient, including the lack of water quality information that renders the DEIS/EIR for water quality significantly deficient. N.15

Ambient Noise Resulting From the Proposed Project

16. As stated by Phil Woodward, Registered Geologist; Certified Engineering Geologist; Certified Hydrogeologist;

"A serious bias in the EIS/EIR is that many of the comments and investigations center around Medicine Lake, a developed recreational and part time residential area, and the main forest access road instead of the project site which is isolated from most human invasions. Background noise and visual interruptions from Medicine Lake are NOT representative of the Medicine Lake Highlands as a whole and should not be used to determine the effects of the project on noise or visual interruptions. A proper evaluation of the project's impacts would be to use the ambient noise levels of the project area itself and the surrounding forest. Here background noise consist of the rustle of leaves, wind blowing through trees, and the occasional screech of a bird of prey. Instead the EIS/EIR determines "significant" impacts based on standards and benchmarks that are more appropriate for populated areas and/or industrial centers where ambient effects are quite high. Such standards are inappropriate for an evaluation in a quiet and pristine environment as the Medicine Lake Highlands." N.16

We reference letter of September 12, 1997 to Randall Sharp, USFS/BLM; Fourmile Hill Geothermal Development Project; EIS/EIR Coordinator; from Phil Woodward, Registered Geologist; Certified Engineering Geologist; Certified Hydrogeologist.

Consequently, the DEIS/EIR is deficient in its disclosure, evaluation, and mitigation of adverse direct, indirect, and cumulative impacts to ambient noise levels resulting from the proposed project.

Impacts to Visual Quality Resulting From The Proposed Project

17. As stated by Phil Woodward, "The visual impacts of the project, including steam plumes, buildings, lighting, and aluminum clad pipelines on the scenic beauty of the area, including designated Unique Geologic Areas, are serious and significant. The Visual Quality Objective in the area of Fourmile Hill is "retain". This requirement cannot be met with implementation of the proposed project and is, in itself, reason enough to deny the project" N.17

"The EIS/EIR states from the cooling towers will be seen as a cloud. This may be true from several hundred miles away; however, for anywhere within 50 miles, it will be identified as what it is, an industrial discharge in the middle of a forest environment. On clear calm days, common in the fall and spring months, the steam plumes will be visible for may miles. This visibility will be enhanced due to the slow dispersion of the plumes under such conditions, resulting in plumes over 500 feet high and visible for fifty miles or more." N.18

"Furthermore, moisture particles from cooling towers act as a nucleus for condensation of ambient moisture in the atmosphere and under certain moisture/temperature conditions or inversions commonly experienced in the area, will result in the formation of large fog banks or low level clouds. Such effects can easily be observed at the cogeneration plants and power plant in Burney and the Wheelabrator generation facility at Anderson. During an inversion, it is not uncommon to observe an opaque ground fog covering 10's of square miles in winter months. Under inversion conditions, the Medicine Lake Caldera would be completely fogged in by the moisture input from the proposed power plant." N.19

We reference letter of September 12, 1997 to Randall Sharp, USFS/BLM; Fourmile Hill Geothermal Development Project; EIS/EIR Coordinator; from Phil Woodward, Registered Geologist; Certified Engineering Geologist; Certified Hydrogeologist.

Consequently, the DEIS/EIR is deficient in its disclosure, evaluation, and mitigation of adverse direct, indirect, and cumulative impacts to visual quality resulting from the proposed project.

Wildfire Danger as a Result of the Transmission Corridor for the Proposed Project

18. The proposed project will consist of a 24 miles transmission corridor to transfer electricity produced at the N.20

geothermal power plant. Maintenance of the transmission corridor has the potential to cause wildfires as a result of the operations of the proposed project. We reference El Dorado County v. Pacific Gas and Electric Company.

The DEIS/EIR failed to disclose, evaluate, and mitigate the threat of wildfires caused by the operations and maintenance of the transmission line for the proposed project. The DEIS/EIR also failed to include fire control and prevention measures based on a detailed description of the transmission corridor.

Vegetation Manipulation - Application of Herbicides - Construction of Roads

19. The DEIS/EIR failed to disclose and evaluate the site-specific vegetation manipulation practices, including the effects to sensitive plant species. N.21

The DEIS/EIR failed to disclose and evaluate the direct and cumulative impacts to the loss of old growth trees which will be harvested to construct the transmission corridor. And the DEIS/EIR failed to disclose and evaluate the cumulative impacts to old growth trees as a result of the Fourmile Hill Geothermal Project, Telephone Hill Geothermal Project, past forest activities, and future forest activities. N.22

The DEIS/EIR failed to disclose and evaluate whether the application of herbicides and any other chemicals will occur during the right-of-way maintenance practices, and also the direct, indirect, and cumulative impacts to water quality in surface bodies of water and groundwater resulting from the use of herbicides and any other chemicals associated with the construction and maintenance of the transmission corridor. N.23

Road construction has had adverse impacts to water quality on lands managed by the U.S. Forest Service. Forest management practices simply do not protect water quality. we reference major sediment problems on the North Fork Feather River [Plumas National Forest]. The DEIS/EIR failed to disclose and evaluate the potential direct, indirect, and cumulative impacts to water quality resulting from the construction and maintenance of roads associated with the transmission corridor, including other roads in the forest. N.24

The DEIS/EIR failed to disclose the frequency of all maintenance activities.

Loss of Habitat to Special-Status Species

20. The DEIS/EIR states that special-status habitat would be lost from construction of project facilities at the wellfield and power plant area, and the clearing of vegetation along N.25

the transmission line corridor. The DEIS/EIS further states that for some species the loss of habitat for northern spotted owl, hairy woodpecker and pileated woodpecker would be considered a loss of habitat. Further, the DEIS/EIR states that the proposed project "could" also affect special-status species through noise and human disturbance during construction, which "could" result in abandonment of a territory or reproductive failure.

The DEIS/EIR alleges that based on the proposed mitigation measures (4.8.3a to 4.8.3n) the levels of significance would be less than significant. This seat-of-the pants finding that the levels of significance would be less than significant is misleading and grossly deficient.

Based on the data (Table 4.8-2) included in the DEIS/EIR, the document shows that 1,230 acres will be lost to bird species habitat, 946 acres will be lost to bat species habitat, and 625 acres will be lost to mammal species habitat as a result of the proposed project. And that the total loss is 2,801 acres to bird, bat, and mammal species habitat.

The information contained in the DEIS/EIR regarding the potential impacts to specific special-status species and their habitat is very limited, and in some cases misleading information.

The mitigation measures cited in the DEIS/EIR for specific special-status species and their habitat provides surveys and studies which should have been conducted and included in the DEIS/EIR. The DEIS/EIR is deficient without including the results of the special special-status species surveys and studies.

The DEIS/EIR failed to disclose and evaluate the cumulative impacts and losses to special-status species habitat resulting from the proposed Fourmile Hill Geothermal Project,the proposed Telephone Hill Geothermal Project, and other activities approved by the U.S. Forest Service and the U.S. Bureau of Land Management. The DEIS/EIR is deficient without this cumulative impact analysis. N.26

The DEIS/EIR also failed to disclose and evaluate the cumulative impacts and losses to special-status species habitat resulting from the proposed transmission corridor and the BPA's Malin-Warner transmission corridor. The DEIS/EIR is deficient without this cumulative impact analysis. N.27

Loss of Public Hunting Rights

21. The executive summary states that the Klamath and Modoc National Forests will also decide whether to amend the forest Land Resource Management Plans to establish and designate a N.28

utility corridor for the proposed project's transmission line and issue forest orders to prohibit the use of firearms in the immediate power plant and wellfield area.

The DEIS/EIR did not disclose and evaluate the direct, indirect, and cumulative impacts to the public's right to hunt and also hunting on federal lands as a result of prohibiting the use of firearms in the immediate power plant and wellfield area. Prohibiting the use of firearms would have adverse impacts to the purpose of the public's right to hunt. The DEIS/EIR is deficient without disclosing and evaluating the direct, indirect, and cumulative impacts to the public's right to hunt and the effects to hunting experiences.

The California Fish and Game Commission regulates fishing and hunting in the State of California. The DEIS/EIR did not disclose whether the U.S. Forest Service has the authority to regulate hunting. This information should have been included in the DEIS/EIR.

Wildlife Electrocution and Collision Hazards as a Result of the Transmission Lines for the Fourmile Hill Geothermal Project, Telephone Flat Geothermal Project, and the Malin-Warner Transmission Lines

22. Construction and operation of the proposed project has the potential to adversely kill or injure threatened and endangered species, special-status bird species, and birds in general as a result electrocution and collision with the transmission lines. N.29

The DEIS/EIR included mitigation measures to reduce the level of significance to less than significant, however the "taking" of threatened and endangered species, special-status bird species, and bird species in general would still occur.

The DEIS/EIR did not disclose and include formal recommendations by the U.S. Fish and Wildlife Service and the California Department of Fish and Game regarding their recommendations to prevent the killing and/or harming of threatened and endangered species, special-status bird species, and bird species. The failure of the U.S. Forest Service and the U.S. Bureau of Land Management not to consult with the U.S. Fish and Wildlife Service and the California Department of Fish and Game regarding the killing (taking) and/or harming of threatened and endangered species, special-status bird species, and bird species is a violation of the U.S. Fish and Wildlife Coordination Act, and also renders the DEIS/EIR deficient. N.30

The DEIS/EIR failed to disclose and evaluate the potential adverse cumulative impacts which adversely kill or injure threatened and endangered species, special-status bird N.31

species, and birds in general as a result electrocution and collision with the transmission lines resulting from the Fourmile Hill Geothermal Project, Telephone Hill Geothermal Project, and the existing Malin-Warner transmission lines. The DEIS/EIR is deficient for failing to disclose and evaluate

Consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game

23. The U.S. Fish and Wildlife Coordination Act requires the U.S. Forest Service and the U.S. Bureau of Land Management to consult with the U.S. Fish and Wildlife Service and the California Department of Fish and Game concerning the potential direct, indirect, and cumulative impacts to public trust resources as a result of the proposed project.

The DEIS/EIR failed to disclose whether the U.S. Forest Service and the U.S. Bureau of Land Management consulted with the U.S. Fish and Wildlife Service and the California Department of Fish and Game in the development of mitigation measures for specific special-status species habitat protection, and also for the loss to habitat. The DEIS/EIR failed to include recommendations by the U.S. Fish and Wildlife Service and the California Department of Fish and Game regarding the loss of habitat to specific special-status species. The DEIS/EIR is deficient and in violation of the U.S. Fish and Wildlife Coordination Act without consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game, including their recommendations, being included in the DEIS/EIR. N.32

Federal Endangered Species Act Consultation

24. The federal Endangered Species Act requires the U.S. Forest Service and the U.S. Bureau of Land Management to consult with the U.S. Fish and Wildlife Service regarding any potential impacts to threatened and endangered species and their habitat. The DEIS/EIR fail to show the U.S. Forest Service and the U.S. Bureau of Land Management consulted with the U.S. Fish and Wildlife Service in the development of mitigation measures and the taking of threatened and endangered species. The DEIS/EIS is deficient and in violation with the federal Endangered Species Act without consultation with the U.S. Fish and Wildlife Service concerning the potential effects to and taking of threatened and endangered species and their habitat. N.33

Economic Analysis is Absent in the DEIS/EIR

25. The DEIS/EIR failed to disclose and include an economic analysis of the proposed project. The economic viability of N.34

the project is very questionable considering the deregulation of the power industry. Is there a markey for this project?? A significant amount of public lands and public natural resources will be adversely affected, including a significant high profile Native American religious area. Based on the adverse environmental and social impacts as a result of the proposed project it should be denied by the U.S. Forest Service and the U.S. Bureau of Land Management. The DEIS/EIR is deficient without disclosing and evaluating a detailed economic analysis of the proposed project.

Alternatives

26. The above stated comments pertain to all project alternatives. N.35

Decommissioning of the Proposed Project

27. Upon decommissioning of this project, the developer, Calpine, should remove the project to pre-project conditions. That is impossible considering the U.S. Forest Service is considering clear cutting and removing vegetation and affecting wildlife habitat along 24 miles of the transmission corridor.

The U.S. Forest Service and the U.S. Bureau of Land Management should require Calpine to post a multi-million dollar bond to assure to the public that the decommissioning of the proposed project will in fact return the land and water to pre-project condition. N.36

The DEIS/EIR should include a decommissioning analysis such as a Plan of Action with related costs which shows the specific amount of money required to return the lands and water affected by the proposed project to pre-project conditions.

Conclusion

28. As stated above, the DEIS/EIS is grossly deficient and is violation of the National Environmental Policy Act and the California Environmental Quality Act and Its Guidelines. N.37

We are requesting the U.S. Forest Service and the U.S. Bureau of Land Management respond in writing to our specific comments in this submittal. N.38

Notice

29. The Fall River Wild Trout Foundation formally request the following documents: N.39

(a) A timely copy of the final EIS/EIR for the proposed project;

(b) A timely copy of the FONSI document for the proposed project;

(c) A timely copy of the Decision document for the proposed project;

(d) Timely copies of all public notices and project notices for the proposed project;

(e) Timely copies of all letters and memos to the to the U.S. Fish and Wildlife Service and the California Department of Fish and Game pertaining to the proposed project;

(f) A timely copy of any and all draft and final environmental documents pertaining to proposed project, the Telephone Flat Geothermal Project, and any proposed project affecting the Medicine Highlakes Area, including the proposed transmission corridor;

(g) A timely copy of any information and data pertaining to the proposed project.

Please forward copies of the above requested documenta and information to the following parties for our review and comment:

J. Dale Dennis, President
Fall River Wild Trout Foundation
39863 McArthur Road
Fall River Mills, CA 96028

Mike Fitzwater, Secretary
Fall River Wild Trout Foundation
2730 Third Avenue
Sacramento, CA 95818

Bob Baiocchi, Consultant
For: Fall River Wild Trout Foundation
P.O. Box 357
Quincy, CA 95971

Thank you for the opportunity to provide comments to you regarding the DEIS/EIR for the proposed Fourmile Hill Geothermal Development Project.

Respectfully Submitted

Robert J. Baiocchi, Consultant
For: Fall River Wild Trout Foundation
P.O. Box 357
Quincy, CA 95971
Bus Tel: 916-836-1115; Fax: 916-283-5017 or 916-283-4999 (Law Office)

Certificate of Service

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project
EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Rich Burns
U.S. Bureau of Land Management
708 West 12th Street
Alturas, CA 96101

Barbara Holder
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1312 Fairland Road
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Diane Henderson-Bramlette
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Richard Elliott, Regional Manager, Region I
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Jim Pedri
Central Valley Region
California State Water Quality Control Board
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Bob Rynearson, President
Fall River Resource Conservation District
P.O. Box 83
McAuthur, CA 96056

Phil Woodward
4340 Eureka Way
Redding, CA 96001

Interested Parties

Letter O

FRIENDS OF THE RIVER

September 26, 1997

Mr. Randall Sharp, U.S.F.S./B.L.M.
800 West 12th Street
Alturas, CA 961101

Re: Fourmile Hill Geothermal Project DEIS

Dear Mr. Sharp:

Friends of the River has reviewed the Fourmile Hill Geothermal Project Environmental Impact Statement and we wish to comment on the proposed project. We are concerned about water quality in Medicine Lake in the absence of a cumulative watershed analysis; the preservation of the Mt. Hoffman roadless area; the violation of visual quality objectives as a result of a geothermal facility; the viability of protected wildlife and plant species found in the proposed project area and the absence of management plans for these species; and the disruption that a geothermal plant would cause to Native American ceremonial and cultural practices. O.1

We urge you to follow Alternative 7, the no-action alternative, so that Medicine Lake can be preserved. O.2

Our largest concern lay with the protection of water quality in Medicine Lake. Medicine Lake lies within an enclosed hydrologic basin and is therefore extremely sensitive to potential water quality impacts. The Modoc LRMP states that Medicine Lake is the largest lake on the District and the most popular recreation area (4-211). This lake also serves the spiritual and sacred ceremonies of the Shasta, Modoc, Klamath and Pitt River tribes and is highly valued within their cultures. The Fourmile Hill Geothermal Project is located within 3 miles of Medicine Lake (EIS, 3-20).

Through conversations with Forest Service representatives, it has become clear that a Cumulative Watershed Analysis has not been done for Medicine Lake in the wake of this geothermal project proposal. Not only is this a obvious violation of the Clean Water Act but is also a blatant disregard for the management guidelines found in the Modoc LRMP, which mandates the maintenance of water quality in Medicine Lake (4-212). Specifically, management for Medicine Lake must evaluate the potential of each project to degrade the lake's water quality (4-212). In the absence of a cumulative watershed analysis, this Fourmile Hill Geothermal Project is not in compliance with this direction. O.3

Furthermore, we are concerned with the scientific validity of the EIS in regards to protecting the water quality of Medicine Lake. Thomas Grose, a leading geologist with the Colorado School of Mines, has expressed concern over the risk of connectivity between the project area and the headwater springs of the Fall River. If these areas are connected, disturbance to the Medicine Lake Highlands will be significant. According to Lawrence Livermore Laboratories, the U.S. G.S. and Dr. Thomas Grose, it is highly probable that most of the water from the headwaters of the Fall River drainage seeps from the Medicine Lake Highlands. Due to the volume and purity of this spring water, any risk of perturbation or contamination of the source area constitutes a threat to the integrity of the Fall River and the aquatic species dependent on the constant flow, clarity, chemistry and temperature of the spring water. O.4

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Investigations should be required to assess the interconnection between both the waters of the Medicine Lake Highlands summit and the springs in the Fall River drainage to determine the potential for contamination of the springs. It is known that the spring sources for the Fall River are capable of remarkably consistent flow volume, even after the long drought periods experienced in recent years. This suggests that there is a connection to vast underground aquifers. Though this phenomena is not fully understood, disturbance to this aquifer without full knowledge of the complex geologic interrelationships would pose an unacceptable risk to the Fall River ecosystem.

In addition, it is probable that there is an interconnection between the "deep thermal waters" and "shallow surficial waters" in the Medicine Lake Highlands due to active fault zones in the area. These faults would maintain and recreate permeability for the exchange of deep and shallow waters, and any high pressure induced fracturing would stimulate further mixing. O.5

The EIS concedes that the potential exists for earthquake-induced landslides in the project area (3-8) and that there are several active fault lines surrounding the proposed plant. The Likely and Surprise faults located 50 and 75 miles east of the site, have the ability to generate a magnitude 5 earthquake, but are downplayed in the EIS report. Clearly the threat of seismic activity is real in this area, since there have been several earthquakes ranging within miles of the proposed site during the past nine years, including a ground rupture that was more than a mile long (EIS, 3-7). For the safety of the public, we urge you to avoid a future potential atastrophe by adopting the No-Action alternative. O.6

The EIS notes that there will be a total of 2 miles of new road construction and roughly 1.25 miles of road improvements on existing roadways (2-20). However, the Modoc LRMP restricts the use of or the obliteration of roads and trails when necessary to protect the soil resource and maintain water quality (4-212). In the Revised Draft Environmental Impact Statement of the California Spotted Owl, roads are said to negatively impact watersheds by the routing of sedimentation and water throughout the watershed. "Greater road densities are more likely to intersect streams and disrupt the routing of water, sediment, and nutrients through the system" (3-147). Increased road densities are a concern because "Current thresholds of concern values used by Sierra Nevada Forests range on average between 11 and 13 percent though recent research shows a significant decline in aquatic macroinvertebrate diversity in Sierra Nevada watersheds with ERA (equivalent roaded acres) above 5 percent (Cal Owl Revised EIS, 3-147)." O.7

It is imperative that the wilderness and roadless character of the Mount Hoffman Roadless Area be retained. The Mount Hoffman Roadless Area has two distinct regions. The first part of this roadless area contains a lush mix of over 5,000 acres of pines and firs which cover the landscape in an unbroken pattern. Bald eagles are found in this area near No Name Lake. From the slopes of Mount Hoffman, one can view scenic Mount Shasta and Lassen Peak. The east side of the roadless area is home to Glass Mountain, which was formed from three independent lava flows. Glass Mountain is classified as a Geological Area by the Pacific Southwest Regional Forester. Such a classification requires that the area remain as close to its natural condition as possible. Do not jeopardize the wilderness characters of the Mount Hoffman Roadless Area by allowing a geothermal transmission line to be placed in this area and disrupt this pristine area. Any human development will disturb the unbroken pattern of the landscape and will violate the requirements of the Pacific Southwest Regional Forester. O.8

The visual quality objectives of the Mount Hoffman roadless area are listed in the EIS. Part of the transmission line for the geothermal project would be placed along Forest Service Road 77, which is an area with a Visual Quality Objective of preservation (3-126). According to the EIS, a VQO of preservation allows for ecological changes only and management activities are prohibited (3-125). The area surrounding the geothermal plant is an area classified under Retention (3-126). Retention requires that the management activity not be visually evident (EIS, 3-125), yet a 50 foot corridor would be cleared for the transmission line (4-84). The O.9

transmission line (4-84). The Medicine Lake Highlands support early to mid-seral size trees and 100 feet of vegetation would be cleared (4-85 - 4-86). Such alterations to the landscape will be visible, as this area has remained undeveloped. Again, Modoc will be in direct violation of their forest plan, if the path for the transmission line is not re-routed.

There are a number of rare and protected aquatic species whose habitat is threatened by the construction of a geothermal plant. The headwater springs of the Fall River support the greatest concentration and largest extant populations of Shasta crayfish, a federal and state listed endangered species. The Shasta crayfish populations are very fragmented and small. If geothermal development of the Medicine Lake Highlands contaminates the groundwater source for the headwater springs, the Shasta crayfish would probably not recover.

A number of other aquatic species are at risk as a result of groundwater contamination in the Fall River headwater springs. These include: rough sculpin, a federal species of concern and a state listed threatened species; bigeye marbled sculpin, a California species of special concern; California floater mussel and montane peaclam, both of which are federal species of concern. Groundwater contamination would pose a serious and irreversible threat to the survival and existence of these rare and protected species. O.10

The quality of the Fall River wild trout fishery is world renown but is currently threatened from sediment impacts. New impacts from a decline in water quality could have devastating effects on this premiere biological and recreational resource.

There are also several areas which support terrestrial management indicator species as well as state and federal sensitive, threatened or endangered wildlife species. Examples of such wildlife include: cooper's hawk, the golden eagle, the bald eagle, the great gray owl, the hairy woodpecker, the loggerhead shrike, northern goshawk, northern spotted owl, osprey, pileated woodpecker, sage grouse, pine marten and several more. Specific management guidelines must be followed to maintain and ensure the survival of these species, which includes any mandated evaluations and surveys for such species like pine marten, northern goshawk, bald eagle and northern spotted owl. O.11

The LRMP for Modoc National Forest states that marten habitat must be managed in the forest. Specifically, management must "maintain habitat for marten during geothermal exploration and development." (4-212) The EIS does not clearly discuss specific management activities to protect marten habitat. Before further planning has passed, it is crucial that a management plan for the pine marten be established or the proposed project will be in violation of the Modoc LRMP. O.12

Northern goshawk live in the Medicine Lake Highlands, where mature forest provide for goshawk and marten habitat (LRMP, 4-211). The goshawk is a federal and state species of concern and a U.S.F.S. Sensitive Species. The Modoc LRMP management strategies are to inventory and protect active goshawk territories needed to meet population targets (4-212). Yet, the EIS concedes that 154 acres of goshawk foraging and nesting sites will lost as a result of the proposed alternative. As a result, the EIS states that mitigation will be used to reduce the adverse impacts from construction. Goshawk management should continue to follow the LRMP Raptor Management Prescription. O.13

The bald eagle is a federal threatened species and a california endangered Species. Modoc National Forest seeks to "develop a bald eagle nest territory management plan" (LRMP, 4-212). According to the EIS, Bald Eagle nesting sites have been reported along the area proposed to house the transmission line and in segment C1 of the preferred alternative, where three roosting sites have been located (EIS, 3-101). Despite this, the EIS states that foraging and nesting habitat would not be lost during with the construction of the geothermal plant, but that there would be some impacts on the birds. The Land and Resource Management Plan (LRMP) states that the Forest Service will assist in the recovery of the species by both surveying and managing potential sites in addition to those currently O.14

occupied (4-26). Thus, the management of this bird should follow the LRMP to manage for bald eagle nesting and foraging sites. In addition, management should continue to follow the Bald and Golden Eagle Protection Act and the Endangered Species Act. It is urgent that the Fourmile Hill Geothermal Project be implemented in a way to protect Bald Eagle nest territories.

The EIS lists several plant species which are sensitive, protected, threatened or endangered. Examples of such species in the proposed geothermal project area include: Ash beardtongue, Ash penstemon, Baker's globe mallow, California pinefoot, Gray penstemon, Hall's sedge, Liddon's sedge, Sugar stick, Tall woolly marbles and Volcanic daisy (EIS, 3-83).

The EIS concedes that there will be the loss of a population of Hall's sedge and several populations of Sugar stick, Gray penstemon and Volcanic daisy, which are found in the proposed plant and wellfield areas (4-93). The EIS states the impact from the losses of these populations will not be significant, but even so, the LRMP states that the Forest Service will conserve sensitive plant populations by identifying and protecting their specific habitats. Care will be taken not to adversely affect their habitats and ensure species viability (3-25). It is highly questionable that such care has been implemented when it the EIS has acknowledged that several species of sensitive plants will be lost as a result of construction. The Modoc LRMP also requires that Species Management Guides be developed for all species on the sensitive plant list (4-21). We urge that the management prescription be followed for all sensitive plants in order to ensure their viability. O.15

The EIS also admits that populations of California pinefoot, Ash penstemon, Baker's globe mallow and tall woolly marbles may exist along segment C1 of the preferred alternative. The loss of these populations are noted as being significant as a result of placement of the transmission line but cannot be avoided (EIS, 4-93). However, it is clear that the first objective of the LRMP is to ensure the viability of sensitive plants and care for their habitats (3-25). The construction of the transmission line throughout this segment will be in violation of the Modoc LRMP and should be avoided. O.16

The EIS states that Talus Collomia is a U.S.F.S. sensitive plant species and is on the C.N.P.S. list (3-75). The Modoc LRMP states that populations of this plant be monitored and protected (4-212); however, such populations may occur on the proposed geothermal project area. The EIS makes no mention of this species, yet it is clear that surveys are required to identify the habitat of this species in order to avoid adverse impacts. O.17

In addition to Talus Collomia, the false truffle is protected under the Record of Decision for Option 9. Specifically, this species of false truffle requires management of known sites and extensive surveys and managing of sites (ROD, C-49), yet the EIS cannot cite its exact location in the project area. This is a clear violation of the Option 9 Record of Decision. Before further planning is developed for the Fourmile Hill Geothermal Project, extensive surveys must be conducted to locate the fungi populations and to manage for them. Clearly, constructing a geothermal powerplant in their habitat will violate the management of the false truffle and any losses of this species is not acceptable despite the claims made in the EIS (4-93). O.18

The Modoc LRMP states specific guidelines for soil management within the project area. Management for soils includes conducting an SRI Order 2 on sensitive soil areas identified in the Modoc SRI Order 3 and to develop site-specific management practices for soil-disturbing activities during the project planning phase (4-212). The EIS makes no mention of the required surveys for the site-specific management practices and the SRI Order 2 study, and should be done before further planning occurs. O.19

A sensitive meadow community, which has been located in segment A1 of the preferred alternative, is eligible for wetlands status. This area contains 750 acres, which lay between Medicine Lake and the Medicine Lake Glass Flow area. Such a meadow would fall under protection as a riparian reserve under the ROD for Option 9, and must be protected accordingly. Management guidelines for this meadow should continue to follow the proper mitigation measures. O.20

The Medicine Lake Highlands are used for cultural practices by the Pitt River bands, the Modoc and the Klamath tribes. The LRMP states that access and use must be protected for Native American religious and cultural locations consistent with the American Indian Religious Freedom Act of 1978. It is not acceptable that possible unknown prehistoric and historic resources will be disturbed as a result of construction (EIS, 4-54). The EIS concedes that significant disturbances will occur (4-53), yet Section 106 of the American Indian Religious Freedom Act states that Federal Agencies shall protect and preserve the rights for Native Americans to freedom of cultural and religious practices through ceremonies and traditional rights (EIS, 4-59, 4-60). The resources such as Medicine Lake and the views from Mount Hoffman, in the Medicine Lake Highlands, are utilized in religious and cultural ceremonies. Disturbances from construction and subsequent alterations of the landscape will diminish their cultural and religious resources. O.21

Given the issues previously mentioned, we urge adoption of Alternative 7-- the No-Action alternative. Alternative 7 will:

* preserve the water quality of Medicine Lake
* preserve the wild and roadless character of the Mount Hoffman Roadless Area
* protect and ensure sensitive and protected aquatic and terrestrial plant and wildlife species
* preserve the habitat of sensitive and protected plant and wildlife species
* maintain the visual quality objectives of Modoc National Forest
* preserve the religious and cultural practices of the Pit River, Modoc and Klamath tribes

O.22

We would appreciate receiving any further documents on this project and notice of any decisions made. O.23

Sincerely,

Katherine Kowatch

Katherine Kowatch,
Public Lands Intern

Letter P

KALAPOOYA SACRED CIRCLE ALLIANCE
CAROL LOGAN
2585 'E' Street, Springfield OR 97477
(541) 726-8854

September 15, 1997

Randall Sharp
USFS/BLM
Four Mile Hill Geothermal Development
Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Mr. Sharp:

RE: COMMENTS ON DRAFT EIS (Project No. 960-62042)

Please accept these comments on the Fourmile Hill Geothermal Development Project Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR).

- The Kalapooya Sacred Circle Alliance is vehemently opposed to any further drilling or development activity at Glass Mountain due to the tremendous environmental impacts that such activity will have on the environmentally significant area. P.1

- The Kalapooya Sacred Circle Alliance is vehemently opposed to any further drilling or development activity at Glass Mountain due to the irreparable and unjustifiable harm that will be imposed on a well-established sacred site. The Abstract for this report indicates that even "...after mitigation, significant impacts would remain for potential conflicts with American Indian uses and values, visual effects near Medicine Lake...the potential for long-term significant and unavoidable American Indian impacts would exist under all alternatives." This project can not proceed without jeopardizing the sovereign and constitutional rights of local indigenous peoples. P.2

- Previously, I wrote and requested a copy of the Project's Cultural File. As a practitioner of the traditional way of life, and an indigenous person of the Northwest, I requested detailed information regarding the cultural impacts of the proposed project, including the record of consultations that have been conducted with the indigenous and tribal communities. I also requested copies of any Memoranda of Agreement or Understanding (MOAs or MOUs) that had been established with the tribal or indigenous communities regarding the conduct of federal actions in and around a sacred site, pursuant to Executive Order #13007. In response to my request, I received a letter denying me this information. I am concerned that my rights to obtain information in a non-discriminatory manner, that would allow me to more successfully evaluate the impacts that this proposed project would have on sacred sites, have been violated. P.3

- Due to the fact that I was not provided with a copy of the cultural file or the MOUs, I am not able to provide you with *specific* information relative to impacts that this project will have on sacred sites. However, I will provide you with *general* information on this subject that I have been able to glean from the DEIS.
  - This Glass Mountain area is considered sacred by many local indigenous peoples who pre-historically, historically and currently utilize and view the area as culturally and spiritually significant. P.4
  - The DEIS indicates that no tribes (and repeatedly indicates that the Pit River Bands/Tribes) have no legal claim or authority to the Glass Mountain Area. It should be noted that it is not a traditional indigenous value to "own" or "claim" land, especially sacred places. A discussion of this issue should have been identified in the ethnographic study/report, as a deeply held traditional belief. Very often sacred sites are not "claimed" by any single tribe or band of indigenous people, and therefore, are not included in their treaty or ceded territory. This is due to the fact that sacred sites are traditionally utilized by multiple bands/tribes of people, and are traditionally "managed" for the use of all people seeking spiritual enrichment. P.5

I look forward to learning about the termination of this project and receiving confirmation of this event as soon as possible. It has been well-established by traditionalists, tribes and comments received by your agency as well as documentation in the Draft EIS/EIR that this proposed development will have significant, irreparable and unjustifiable impacts on a site that is held sacred by many indigenous peoples of the Northwest. In the interest of preserving non-renewable, priceless, culturally significant resources and values, it is recommended that the USFS and BLM proceed with their obligations under federal law to ensure that the Glass Mountain area be removed as a KGRA and listed on the National Historic Register. In this way Glass Mountain will be permanently protected from degradation by resource extraction activities and preserved for its over-arching and intrinsic spiritual values. Thank you. P.6 P.7

Respectfully,

Carol Logan

Carol Logan
Kalapooya Lineal Descendant

cc: Grand Ronde Confederated Tribes - Cultural Committee
Siletz Confederated Tribes - Cultural Committee
Umatilla Confederated Tribes - Cultural Committee
Warm Springs Confederated Tribes - Cultural Committee
Yakima Nation - Cultural Committee
Klamath Nation – Cultural Committee

Klamath Forest Alliance
P.O.Box 820 Etna, California 96027
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September 15, 1997

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

SUBJECT: Comments on the Proposed Fourmile Hill Geothermal Project Draft EIS\EIR

Dear Mr. Sharp:

Below are the Klamath Forest Alliance's comments on the above-referenced project.

The area in which the proposed Fourmile Hill Geothermal Project is located, the Medicine Lake Highlands, is a critical biological link between the Modoc Plateau and the Cascade Mountains, contains two roadless areas, rare old growth groves, Northen Spotted Owls, California Spotted Owls, Fishers, Pine Martens, Northern Goshawks, and many other wildlife species. The area also has religious and cultural significance for Native Americans. Because of the uniqueness and crucial biological role of the area, the Klamath Forest Alliance supports the No Action Alternative. Q.1

While geothermal energy may be "greener" than many other forms of energy, it is not worth the long term degradation of important wildlife habitat and sacred Native American sites for short term energy production and profits for the corporation developing this energy. If as much money and effort were put into energy conservation or developing more efficient uses of energy as has been (and will be if it proceeds as proposed) put into this project, we would be a long way towards living more sustainably. Q.2

1. Effects on Wildlife

The EIS/EIR discloses effects on a myriad of species. We are concerned about the negative effects on all species, but are particularly concerned with martens, fishers, and goshawks. Martens and fishers are forest carnivores whose numbers have been declining steadily. Fishers and goshawks are species of special concern at both the state and federal level, and the marten is a USFS Region 5 sensitive species. Any negative effects to these species could drive them further towards listing as threatened or endangered species under the federal Endangered Species Act. Q.3

The EIS/EIR indicates that effects of the project construction on late seral forest and individual trees and snags equal to or greater than 18 inches would be significant. The loss of old growth Q.4

and other late seral habitat and the value they have for many species cannot be mitigated in the short term.

The EIS/EIR also states that noise effects of the proposed project's construction and well-drilling phases would "temporarily" displace wildlife from an area up to 400 feet from the sources of noise disturbance. These activities will take place in the summer and fall months over a three-year period, so it is more likely that this disturbance will be permanent, not temporary. The wildlife is not going to take a sabbatical during the noisy times, they are going to pack their bags and leave town! As more and more habitat is degraded (as this proposed project admittedly will do), wildlife will have less places which provide good habitat to move into. Q.5

2. Roadless Area Effects

The Mount Hoffman Roadless Area will be significantly affected by the proposed project. The EIS/EIR evaluates some of the effects of the proposed action on the Roadless Area and concludes that they are less than significant. However, the EIS/EIR does not evaluate the effects of the proposed project on the Roadless Area in relation to its importance to wildlife and humans. Roads, rights-of-way, and transmission lines into the Roadless Area will disturb wildlife by the noise of motorized vehicles, as well as increase the chances of poaching and collisions between wildlife and motorized vehicles. Q.6

It is important to consider that forested roadless areas are rare in the Medicine Lake Highlands and provide values that, once eliminated, are not easily replaced. The EIS/EIR for this proposed project does not adequately consider and disclose these effects, and as a result, does not fully inform the public of the consequences if the project goes forward.

3. Native American Concerns

The EIS extensively discusses the effects of the proposed project on traditional Native American sites and religious practices, and concludes that even with mitigation, there will potentially be significant effects to these values. Q.7

Native American sacred sites are under assault by logging, mining, and other types of development (such as the proposed project) all across the United States. This is tragic and must be stopped. A geothermal development would not be allowed to be built next to a church or temple, and it should not be allowed in an area as sacred as the Medicine Lake Highlands. Q.8

Because of the effects of the proposed project to Native American religious and cultural uses of the Medicine Lake Highlands, the No Action Alternative should be chosen. Q.9

4. Recreation

The Medicine Lake area has outstanding recreational opportunities which are being enjoyed by increasing numbers of visitors. The proposed project will degrade the recreational experience for Q.10

visitors, despite the conclusions of the EIS that none of the impacts will be significant. The EIS callously suggests that visitors who are bothered or annoyed by the sights and sounds of the project "can readily move out of the area or make a decision not to recreate in proximity" to the project sites!

The problem is that more and more public land is being adversely impacted by timber cutting, grazing, and developments like the proposed project, leaving less and less places for an undisturbed recreation experience. For these reasons, the effects of the proposed project on recreation are significant and the EIS should have stated such.

Conclusion

Because of both the short-term and long-term impacts of the proposed project, and the fact that the area will be irreparably harmed in exchange for 45 years' worth of electricity, the No Action Alternative should be chosen. Q.11

If the No Action Alternative is not chosen, then Alternative 6 should be chosen. The transmission lines for the proposed project should follow existing roads and other utility rights-of-way entirely. The last thing the Medicine Lake Highlands area needs is more roads and rights-of-way fragmenting forests and other types of wildlife habitat. Q.12

Sincerely,

Lori J. Cooper
Forest Protection Coordinator

cc: California Wilderness Coalition
Seventh Generation Fund
Mike Hauptman
Medicine Lake Citizens for Quality Environment
Medicine Lake Homeowners Association

Letter R

The Klamath Tribes
P.O. Box 436
Chiloquin, Oregon 97624
Telephone 541-783-2219
FAX 541-783-2029
FAX (Planning Dept.) 541-783-3406
800-524-9787

September 15, 1997

Diane Henderson Bramlette
Forest Supervisor
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Diane,

The Klamath Tribes have reviewed the Environmental Impact Study Four Mile Hill Geo-Thermal project and have decided that this project cannot be supported by the Klamath Tribes. There are far to many issues we feel cannot be mitigated. We will offer comments , issues, concerns and recommendations below. R.1

The area that this project is located in is a very sensitive area, the project area contains numerous Cultural Resources, of the tangible and intangible nature. R.2

It has also been stated by the Klamath Tribes that a known Modoc religious leader, conducts and instructs Tribal members in Traditional Religious and Cultural Ceremonies in the Medicine Lake area.

The religious ceremonies that are practiced in this area should alone stop this project. The Geo-Thermal project will have negative impacts on traditional religious and cultural practices, these negative impacts come in the form of, R.3

1. Altering the natural landscape.
2. Disrupting visual quality.
3. Interfering with spiritual solitude when praying or conducting other traditional ceremonies.
4. Possible destruction of cultural artifacts
5. Noise pollution
6. Harassment of wildlife.
7. Destruction of much needed habitat for wildlife.
8. The removal of wildlife from their natural range or homes.
9. Possible negative effects to natural ground water sources.
10. Air pollution.
11. Possible damage or removal of Botanical resources (cultural plants foods and medicine).
12. Interruption of other Tribal activities (camping, socializing, gathering).

Through the development of this Geo-Thermal project it has the ability to compromise traditional access by Tribal members to a cultural area, furthermore this development may cause Tribal members to altogether abandon cultural use of the entire area. R.4

The development and destruction of cultural areas has been a common practice by the Euro-Americans for the last 200 plus years. Today there are very few cultural areas that have not had some kind of alteration done to them. It is very important that federal land managers understand that these type of projects can cause irreplaceable harm to sacred areas. This has been a longtime problem for the Tribes, educating other cultures to not only be sensitive but also to protect and preserve places like the Medicine Lake area as a whole. R.5

The Klamath Tribes stand strong on the protection of its Sacred and Cultural sites and request that the Modoc National Forest assist the Tribes in the protection of this cultural area. The Klamath Tribes are well aware of the responsibility that the forest service has in managing and protecting cultural resources, we ask the Modoc National Forest to go one step further and start to manage for the living culture of the Klamath Tribes. R.6

The assistance we are requesting is to not allow the development of the Geo-Thermal project in the Medicine Lake area. If you have any questions please call me at the Klamath Tribes Culture and Heritage Department the telephone number is 541-783-2218.

Dino Herrera

Cultural Site Protection Specialist

Letter S

Lawrence Livermore National Laboratory

September 12, 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project
EIS/EIR Coordinator
800 W. 12th St.
Alturas, CA 96101

Dear Randy,

This letter is in regard to the Draft Fourmile Hill Geothermal Development Project EIS/EIR of July, 1997. We have reviewed the hydrology section and offer a newly published report in response. In particular, we would like to point out that, based on our stable isotope data, groundwater recharge and flow beneath the Medicine Lake region must be a significant component feeding the Fall River Springs. Our carbon isotope data also shows that a large magmatic carbon dioxide component occurs in the Fall River Springs, and is of such a large magnitude that it can only be derived from a large and active geothermal system like that found beneath Medicine Lake Volcano. This latter evidence disproves the opposite claim made in the second paragraph on page 3-27 of the Draft EIR/EIS. In addition, a unprecedented amount of heterogeneity in fracture permeability must exist throughout the subsurface in this region in order to direct such a large groundwater flow to the Fall River Springs. Therefore, in our opinion and experience, designation of groundwater divides in this area based on surface topography as made in figure 3.3-1 are overly simplistic and unsubstantiated. S.1

Although, the Fourmile Hill is only one small project, the total energy potential of this area and the cumulative effect of additional power plant development over the years increases the potential for possible impact to the Fall River Springs. As we have discussed in the past, we feel the most important issue in regards to proposed geothermal development in the Medicine Lake region is the connection between the shallow fresh water and the deep geothermal system. Our report demonstrates that there is a connection with respect to carbon dioxide. It is our opinion, however, that determining the extent of that connection and its ultimate influence on Fall River Springs will be difficult to predict, and probably only worst-case and best-case scenarios could be developed. Therefore, we feel that a more important focus should be on a responsible and viable monitoring plan of the Fall River Springs system. This monitoring should include at least monthly flowrate, temperature, and conductivity measurements conducted before, during, and after geothermal energy development in the Medicine Lake area. S.2 S.3

Thank you for your attention, and please feel free to call if you have questions or comments.

Sincerely,

M. Lee Davisson

Timothy P. Rose

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Letter T

Medicine Lake Citizens for Quality Environment
P.O. Box 34 • Mount Shasta, California 96067
Janie Painter, Chairperson • 916-926-5514

September 30, 1997

Mr. Randall Sharp, USFS/BLM
EIR/EIS Coordinator
Fourmile Hill Geothermal Development Project
800 W. 12th Street
Alturas, CA 96101

Re: Fourmile Hill Geothermal Development Project — Draft EIS/EIR

Dear Mr. Sharp:

I have been asked to review and submit comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Development Project on behalf of the Medicine Lake Citizens for Quality Environment, a citizens' group formed in response to Calpine Corporation's proposal to develop Fourmile Hill. It is comprised primarily of the owners and users of recreational cabins and facilities of the Medicine Lake area.

Members of the Medicine Lake Citizens group have consulted with members of other affected interest groups about the proposed development project. These other groups and individuals have far more knowledge and expertise about specific topics than we, and for that reason we would like to adopt their comments as our own. For purposes of legal standing, then, we would ask you to consider their concerns to be ours as well. In particular, we would incorporate as our own the issues and concerns expressed by Medicine Lake property owners, native Americans, Fall River Wild Trout Foundation, California Wilderness Coalition, and Klamath Forest Alliance. Individuals whose letters of comment represent our concerns include, but are not limited to: Janie Painter, Jerry Turek, Carol Plank, Michelle Berditschevsky, Phil Woodward, Louise Thompson, and Suzanna and Peder Cuneo. It is necessary to ask that we be allowed to "incorporate by reference" in this because so litle time for public comment was still allowed after the DEIS/EIR was finally received by members of the public. Please see the Cuneos' September 15 letter to you for a detailed account of the public's largely unsuccessful attempts to obtain relevant project information in a timely manner. T.1 T.2

The proposed project is highly controversial because of the adverse environmental and social impacts which cannot be mitigated or are being unreasonably and inadequately mitigated. Native Americans from several different tribes and councils, cabin owners at Medicine Lake, snowmobilers, hunters, and fishermen — long-time, regular users of the Medicine Lake area — will be significantly and adversely affected by the proposed project. Their traditional uses of the area will be impacted by air and noise pollution; acid rain or acid fog damage to plants, water, and fish and wildlife; fragmentation and loss of forest ecosystems throughout the extent of the T.3

transmission line corridor; light pollution at night; and visual and aesthetic quality degradation due to both the power plant and the transmission line.

The people who stand to be the most adversely affected by the proposed project have been shocked and dismayed by the manner in which geothermal development authorization is being handled. In several places in the DEIS/EIR, it is asserted that the Federal Government has already made decisions to allow not only exploration, but also commercial development, of the Glass Mountain Known Geothermal Resource Area (KGRA). Yet the long-time residents and property owners at Medicine Lake do not recall ever being contacted about such a major decision-making process. We believe that the DEIS/EIR misrepresents the extent to which development rights have been vested in geothermal leaseholders, with or without due public process. Furthermore, we believe that if development (as opposed to exploration) was essentially approved at the time of the leasing decisions, then BLM and USFS have failed utterly in their NEPA duties to properly scope and tier NEPA documents. If specific geothermal resource development was approved earlier, then the USFS has also failed to properly anticipate and provide for such facilities in the Modoc and Klamath National Forest Plans. T.4

The project files contain numerous pieces of correspondence, some dating back to 1979, that warn the BLM and USFS to do a comprehensive environmental review of commercially developing the Glass Mountain KGRA. Potential geothermal developers and private citizens alike pressed for cumulative, full build-out projections and reviews. It has been brought to the lead agencies' attention that project proponent Calpine has publicly announced its intention to construct an operate a 135-MW geothermal plant at Fourmile Hill, not the 49.9-MW facility being considered now. In addition, CalEnergy and a third, unidentified party are known to be planning other geothermal energy plants at Telephone Flat and elsewhere in the Glass Mountain KGRA. Finally, transmission line capacity is intentionally being proposed to accommodate additional future, but unanalyzed, power production (please see DEIS/EIR pp. 2-37 and 2-38). T.5 T.6 T.7

To date, the BLM and USFS have steadfastly ignored NEPA's requirements at 40 CFR § 1502.4 to properly define the scope of environmental review at various decision points. Air and water quality impacts, for example, have never been modelled for long-term commercial operations, because all past environmental reviews considered only leasing or only exploration activities. The exploration and testing which have been permitted, and whose results are necessary to an informed estimation of environmental effects, have not been performed. Thus it is improper and illegal to arrive at this decision point and say that the real authorization for industrial geothermal development was made in the past. T.8

It would also be premature to move forward with a final EIS/EIR and a Record of Decision at this time. Testing of deep wells for geothermal energy and chemical content is a necessary and critical step in the information-gathering process, without which a responsible and defensible decision is impossible. Pursuant to Section 102(2)(c) and other requirements of the federal National Environmental Policy Act (NEPA), the U.S. Bureau of Land Management and the U.S. Forest Service have duties and responsibilities as lead federal agencies to ensure that the EIS/EIR is in full compliance with NEPA and its requirements. Full and fair disclosures of relevant information, professional and scientific integrity of work, mitigation or avoidance of adverse effects, and comprehensive scope of analyses are all part of fulfilling NEPA's purpose. Duties and responsibilities of the Siskiyou County Air Pollution Control District to regulate air emissions and protect air quality fall under T.9 T.10

the California Environmental Quality Act (CEQA) and its implementing guidelines for public disclosure of not only the potential adverse environmental effects, but also of the maximum possible mitigating measures available. The DEIS/EIR falls far short of meeting NEPA and CEQA requirements.

The EIS/EIR itself is premature, in that sufficient information is not yet available to conduct evaluations of the long-term and irretrievable commitments of public resources being contemplated in the Fourmile Hill development decision. The exploration permit obtained by the proposed Fourmile Hill developer has not been exercised through the test well stage; there has not yet been full demonstration of commercial geothermal potential. Thus the infliction of any adverse effects, however mitigated or remote, cannot be weighed against potential benefits with any level of certainty. T.11

Endangered species information, effects and mitigation analyses, and Endangered Species Act consultations with the U.S. Fish and Wildlife Service, are all incomplete at this time, from what we are able to discern in the DEIS/EIR. T.12 The proposed mitigation measures are undefined and unmeasurable: the loss of mature and old-growth forest that took centuries to grow cannot be effectively mitigated by minimizing the amount destroyed. Nor can paying for an undetermined amount of prescribed burning elsewhere adequately compensate for its loss, as indicated in the DEIS/EIR. T.13 Cumulative effects of all known and reasonably foreseeable geothermal energy developments in the Glass Mountain KGRA have still not been disclosed and evaluated. T.14

Forest management direction for hundreds of square miles of the Modoc National Forest has not yet been adequately re-evaluated and the potential resource conflicts have not been resolved or mitigated in any meaningful way. The DEIS/EIR misses the main points of conflict between the existing Forest Plans and the proposed project, and furthermore neglects to provide for Forest Plan revisions and amendments to both accommodate and compensate for the Fourmile Hill project and its transmission line. Federal regulations implementing the National Forest Management Act (36 CFR Part 219 et seq.) require that all actions, permits, contracts, etc. on national forest lands be consistent with the applicable Forest Plan (36 CFR § 219.10(e)). Prior to approving the proposed project, the Modoc National Forest must amend and revise its Forest Plan. T.15

It is not just the Mount Hoffman roadless area that would be affected in a manner inconsistent with the Modoc Forest Plan (a management prescription of Semi-Primitive Non-Motorized applies to the released roadless area). T.16 The Medicine Lake area is supposed to "feature outdoor recreation use" (Modoc National Forest Land and Resource Management Plan, p.4-213) and to provide habitats for specialized, mature- and old-growth-dependent wildlife species. These resources, and the Geologic Special Interest Areas that would also be affected visually, cannot be managed in the manner prescribed in the Forest Plan if the proposed geothermal plant and transmission line are built. Management direction for Modoc National Forest Management Areas 61, 62, and 63 must to be revised. T.17

The DEIS/EIR is fundamentally flawed in its approach to impacts analysis, in that it fails to disclose the potential environmental effects that could result from geothermal development at Fourmile Hill, including equipment failures and accidents. Instead, the DEIS/EIR limits its impact analysis to the <u>intended mitigated levels</u> of effects to critical environmental resources. The potential unmitigated effects, however, could ramify throughout the local ecoystem. These need to be T.18

investigated and analyzed in the EIS/EIR. For example, if there are higher concentrations of H_2S released than have been presumed, acid fogs could form in the air inversion events which occur frequently in the Medicine Lake caldera. Acid rain or acid fog deposition effects on trees, lichens, and fungi would be adverse and could be severe for some organisms. Acid deposition into Medicine Lake could harm the fishery, which in turn would adversely affect the resident bald eagles and osprey that rely on the fishery as a food source. T.19

The DEIS/EIR's treatment of transmission line impacts on forest ecosystems and wildlife habitats is also fatally flawed in that it has no spatial consideration of effects. It is not enough to report the number of acres of each forest type that will be removed; the fragmentation and edge effects on the surrounding forest ecosystems must also be analyzed and disclosed. How and where habitat blocks will be set aside to provide compensation for the number of disturbed American marten territories, goshawk territories, etc., must be determined in a Forest Plan/NEPA process. The EIS/EIR process hasn't addressed these issues yet. T.20

Therefore it is the recommendation of the Medicine Lake Citizens for Quality Environment that the EIS/EIR not be finalized until fundamental informational and analytical deficiencies have been cured. Alternatively, BLM and USFS could justifiably decide to adopt the "No Action" alternative on the basis of its being the environmentally perferable alternative as of the current state of knowledge. T.21

We appreciate your receiving and considering these and other public comments. We would welcome additional opportunities to learn more about and comment on the proposed Fourmile Hill Geothermal Development Project. Please add my name and address to your public involvement list for all future mailings and notices concerning this project. T.22

Sincerely yours,

Linda L. Blum

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Quincy, CA 95971-1749
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Letter U

September 25,1997

Mr. Randall Sharp
USFS/BLM Project Leader
Fourmile Hill Geothermal Development
800 W. 12th. St.
Alturas, CA. 96101

re: Comments to Draft EIS/EIR

Dear Mr. Sharp,

We feel that the Draft EIS/EIR and Calpine have failed to properly address important issues from the conception of the proposed Fourmile Hill geothermal project.

The EIS/EIR contains incomplete and misguided information concerning the scoping process and public input, exploration, water and air quality, recreation, road conditions, old growth forest, cumulative effects and more. U.1

PUBLIC SCOPING and EXPLORATION:

Calpine failed to properly inform the public of their plans for the Fourmile Hill project. On Sept.27,1995 Calpine had their one and only public scoping meeting at the Goosenest Ranger Station in McDoel. Effective public participation in the scoping process can not occur when the meetings are held on weekdays at remote ranger stations. The concerned people of Mt. Shasta, Alturas, Redding, Tule Lake and Klamath Falls. were kept in the dark concerning this public scoping meeting. Only four people attended Calpine's public scoping meeting and two of those people were there on other business. U.2

The public scoping meeting was supposed to address Calpine's Plan of Operation for an exploratory project at the Fourmile Hill location. This exploratory project included the drilling of temperature gradient wells and TWO deep exploratory wells. A temperature gradient well was the only well drilled.

The exploratory wells are supposed to be drilled to prove that a viable geothermal resource exsists and to prove the extent of the resource. Exploratory drilling will also determine the wells chemical make-up and contents.

Calpine has NOT drilled these vital exploratory wells. Instead Calpine has jumped right into the development stage. How can Calpine develop a power plant and build a transmission line when the geothermal resource has not been proven to exsist? Calpine is putting the cart before the horse. U.3

EXPLORATION: (cont.)

According to the 1984 Supplemental Environmental Assessment for the KGRA (pg.40, paragraph 5), "Deep exploratory wells will provide specific data to more accurately analyze and predict effects on subsurface hydrology, and thermal and nonthermal surface waters. The exploration phase of this project is therefore essential to answering the questions reguarding impacts of development. Exploration will yield necessary information on temperatures, pressures and fluid characteristics at depths which are currently only speculation. Information on rock types, permeability and porosity will also be aquired by deep exploratory drilling, thus adding substance to current hypotheses and models."

Therefore, Calpine MUST drill deep exploration wells before the development stage is even considered. This issue must be addressed in writing.

HYDROLOGY:

(pg.3-14) The hydrology data in the Draft EIS/EIR is provided by the Calpine staff. The information supplied by Calpine is full of suppositions such as, "appears, probably, it is assumed, data suggests, interpreted ",(pgs. 3-14,3-15 & 3-21). According to the North Coast and Central Valley Water Quality Control Boards, knowledge concerning ground water and surface water flows within the area is limited. Calpine's suppositions support the limited knowledge theory. U.4

Paynes Springs Creek, Crystal Springs Creek, Medicine Lake,Blanche Lake, Bullseye Lake and Little Medicine Lake are the only significant surface waters in the Medicine Lake Highlands. The water quality of Medicine Lake is considered to have good clarity, low nutrient levels and good buffering capacity. All other surface water sources in the area are also believed to have excellent water quality. (Jones,R. 1983). Calpine has not thoroughly addressed the potential contamination of these surface waters. U.5

The detrimental effects on the surface and ground waters due to accidental hazardous spills, cooling tower drift, air inversion conditions and the loss of circulation during drilling must be addressed in writing in the final EIS/EIR. U.6

The porous volcanic ground in the Medicine Lake Highlands is conducive to the ground water being contaminated by accidental spills. The contaminated ground water could thus contaminate the entire aquifer. Will the pristine cold water aquifer become contaminated and undrinkable? Please address this issue and the fact that Calpine employees will be drinking bottled water. (pg.2-33 EIS/EIR) U.7

HYDROLOGY: (cont.)

Calpine plans to use water from water wells located in Arnica Sink. Millions of gallons of water will be needed from the aquifer. Medicine Lake and the Arnica Sink aquifer are related. If surface water levels and domestic water well levels drop because of excesive water useage by Calpine, how will that issue be resolved? U.8

Calpine must provide up-to-date water quality and quanity monitoring. A water chemistry analysis must be done prior to any drilling. The effects of air emissions (cooling tower drift, well venting, construction etc.) on Medicine Lake and surrounding surface waters must be monitored. How else will the effects be determined? Mitigation measures (4.3.2a and 4.3.1a) only address the effects after the damage is done. U.9

According to the 1984 Supplemental Environmental Assessment (pg. 44) "Accidental puncturing of an aquifer during drilling or fracturing of bedrock during active seismic testing could cause ground water movement or mixing. While unlikely, such accidents could potentially cause fluctuations in quanity, chemical content or temperature of spring or stream flows." Isn't this the same scenario that the Fall River Resource Conservation District was referring to in their letters of concern and comment about the Fourmile Hill project? These issues must be addressed in the Final EIS/EIR. U.10

Another issue brought to light in the 1984 Supplemental Environmental Assessment (pg. 36) is the following: "Any contamination of the water could eliminate or reduce the fishery in the lakes, thereby reducing their recreational value." What will lake water contamination do to the endangered Bald Eagles, Osprey and other animals eating contaminated fish? Please address these issues in writing. U.11

The US Geological Survey has proposed a hydrologic and geochemical monitoring plan to monitor lake, groundwater, or surface water changes from geothermal resource development at the Glass Mountain KGRA. This plan must be implemented before any further geothermal development, including the Calpine Fourmile Hill project, is activated. The USFS/BLM must insist that this monitoring be started. Please address this issue. (pg.3-27 EIS/EIR) U.12

RECREATION:

The Medicine Lake Highlands provide a valuable year-round recreation area for Siskiyou County. The USFS and the state of California have spent hundreds of thousands of taxpayer dollars to develop recreation in the area.-(pg.3-157 table 3.11-1) U.13

RECREATION: (cont.)

Medicine Lake is unique in that it is a high mountain lake with public access. (pg.3-157)"Medicine Lake has an estimated 40,000 recreationalist visit yearly, with increased use on the rise." Check pg. 3, paragraph 4 of this letter. The proposed geothermal project will detract from the Medicine Lake experience.

(pg.4-193) "Any recreational user that is bothered or annoyed by operational noise or odors, or the visibility of the facilities at this site, can move out of the vicinity or make a decision not to hike or hunt in proximity to this site. etc." This response is unacceptable, people come to Medicine Lake to get away from urban industry, noise and pollution. The Medicine Lake homeowners can not move, they will be trapped by the pollution, noise, visual and water quality losses along with the loss of their property values. U.14

Winter snowmobiling is another valuable resource for Siskiyou County. Much revenue is generated by the sport: Cost of the machines ($6,000 to $10,000),licenses, taxes, insurance, gas and oil, lodging, food, maintenance and all the misc. costs incurred by the sport.

The Medicine Lake Highlands provide some of the best snowmobiling in the county. Reasons being: Wonderful snow conditions, a trail system consisting of groomed and marked trails, plenty of unmarked riding areas and four snowmobile parks that feed the area with riders, two of the parks are within ten miles of the lake. The Highlands provide riding areas for every level of experience from the novice to the expert. U.15

Geothermal development will ruin many aspects of this sport in the Highlands. The plowing of roads used as snowmobile trails, the 36" above ground steam pipelines and the transmission line will all become obstacles. Many snowmobilers will not return once they have experienced the geothermal obstacle course.

(pg.4-212 EIS/EIR) Calpine plans to use the Four Corners Snowmobile Park as a commuters parking lot. This plan is unacceptable, the park was built with California DMV Off-Highway Green Sticker funding as a snowmobile park, not a commuters "park and ride" parking lot for Calpine employees. U.16

AIR QUALITY:

The air quality within the Glass Mountain KGRA is excellent, only marred by minimal road dust. The geothermal developments will bring an array of new air pollutants, including maximum construction road dust conditions. But road dust is the least of our concerns. U.17

AIR QUALITY: (cont.)

(pg. 3-185 table 3.13-3 EIS/EIR) This table only evaluates Calpines compliances with the State Ambient Air Quality Standard. Evaluations must also be made on the effects to the water quality and on the total biology of the area. (pg. 4-36 table 4.3-3 EIS/EIR) This table shows the Deposition of Air Emission on Medicine Lake. Included in these emissions are hydrogen sulfide, boron, mercury, lead, arsenic and other heavy metals. These air emissions will change the air quality of the area, excellent air quality will no longer exsist. The emissions will also settle on vegetation, wildlife and their food sources, and humans. These issues must be addressed in writing. U.18

The Siskiyou County Air Pollution Control District is going to monitor the amount of emissions pumped into the atmosphere. Will a new employee have to be hired to do this? And how often will pollution levels be monitored? When an "upset" condition occurs will the public be informed of dangerous emission levels? Will SCAPAD warn the public? These emissions could lead to a public health hazard. U.19

Medicine Lake has a natural occuring air inversion condition. It is particularly obvious in the winter time. Will this air inversion condition trap excess air emissions within the caldera? Will it lead to unsafe levels of emissions, trapped within the fog? This air inversion condition will be multiplied by cooling tower drift, well venting and plant vent silencers which will dump steam and condensate emisssions into the atmosphere. Will this condition create a toxic fog?//Another concern is the possibility of highway icing from cold weather conditions and emissions. This icing will also occur on trees and vegetation. Please address these issues in writing. U.20 U.21

ROAD CONDITIONS:

The Draft EIS/EIR has failed to properly address dangerous road condition that will exsist within the Medicine Lake Highlands. The elevation and snow conditions will lead to numerous hazardous road conditions. The county and forest service roads that will be used are narrow, shoulderless, unimproved with sharp curves and in need of repairs. Year around accidents will occur, especially with the predicted 228 trips per day during the summer, with an additional 68 truck trips per day.(pg.4-211 EIS/EIR). These figures do not include the 40,000 recreational users who will also be on the roads. Large quanities of hazardous materials and wastes will be transported to and from the power plant on these roads. Hazardous spills due to trucking accidents will occur. Please address these road and accident issues in writing. U.22

OLD GROWTH FORESTS:

Several stands of old growth red fir will be impacted by the proposed geothermal development, these trees must not be cut. But far worse, is the devastation that will happen to the old growth lodge pole pine because of the power plant and transmission line construction. Old growth lodge pole pine is not determined by the "chest height" formula. It is determined by the wildlife that inhabits the area, wildlife such as the northern goshawk, northern spotted owl, American martens, hairy woodpeckers and several other spieces. Please address these issues in writing. U.23

EROSION:

(pg. 2-21 EIS/EIR) The Draft fails to address the possibility of erosion caused by leaks in the fresh water pipeline between Arnica Sink and the Calpine project. This pippeline line will transverse sharp volcanic rocks, uneven terrain, downed trees and branches. Leaks in the pipeline would cause erosion, which in turn could damage roadways, groundcover vegetation and nearby cultural resources along the pipeline route. Please address these issues in writing. U.24

CUMULATIVE EFFECTS:

The cumulative effects of all proposed and possible future geothermal developments within the Glass Mtn. KGRA must be addressed. A full disclosure and analysis of the environmental consequences must be made. Cumulative significant impacts will ocurr with each new proposed project. Future developments must not be piecemealed, their impacts must be addressed now. According to the Draft EIS/EIR, the cumulative effects of the Calpine and CalEnergy geothermal projects are not considered significant. How can that be, when TWICE the impacts on the environment, on the wildlife, on cultural resources and on every aspect of the Medicine Lake Highlands will occur? U.25

The Medicine Lake area is a very special place. It is a pristine remote region that needs to be saved. There are no telephones or power lines, no stores or gas stations. it is a beautiful recreation destination. It is a true visitors paradise, enjoyed by campers, hikers, fishermen, hunters and all recreationalists. There is not another place left in California, like Medicine Lake. U.26

Industrial and commercial developments have ruined so many beautiful areas of our state. This last summer, President Clinton and dignitaries visited Lake Tahoe. There they witnessed First hand commercial devastation of Lake Tahoe and the effects on the surrounding environment. Why are the US Forest Service and BLM promoting industrial devastation for Medicine Lake? Medicine Lake is the Crater Lake of California, can they afford to promote the devastation of such an unique area? When will it stop?

The people need Medicine Lake For relaxation and recreation. The people do not need over priced eletrical power development that will create irreversible environmental damage to California's last pristine getaway.

Please help us save Medicine Lake. The only acceptable alternative to this project is Alternative 7, the no action alternative. U.27

Sincerely,

Janie Painter

Janie Painter
Chairperson, Medicine Lake Citizens For Quality Environment

Rob Painter

Rob Painter

cc:
President Bill Clinton
Vice President Al Gore
Senator Barbara Boxer
Senator Diane Feinstein
Mr. Bruce Babbitt BLM
Mr. Dan Glickman USFS
Mr. Lynn Sprague USFS
Mr. Edward Merrihew Calpine
Ms. Kathy Fisher BPA
Mr. Rich Burns BLM
Ms. Diane Henderson-Bramlette USFS
Ms. Barbara Holder USFS
Mr. Pat Griffin SCAPCD
Siskiyou County Supervisors

7

Letter V

Medicine Lake Citizens for Quality Environment
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Randall Sharp — Project Leader
Fourmile Hill Geothermal Project
U.S. Forest Service
800 W. 12th Street
Alturus, California 96101

PUBLIC COMMENTS: FOURMILE HILL GEOTHERMAL POWER PLANT EIR/EIS
Medicine Lake Area, California — State Clearinghouse No 96062041

Dear Mr. Sharp: September 27, 1997

Medicine Lake Citizens for Quality Environment is a group of concerned citizens who live, utilize recreational facilities and campgrounds, or own property in the vicinity of Medicine Lake and this proposed project. As such, we submit these additional comments out of concern that the EIR/EIS for this project is inadequate. (For simplicity, we will henceforth use the term "EIR" in place of "EIR/EIS").

The California Environmental Quality Act's (CEQA) overriding and primary goal is to protect the environment. (Public Resources Code §§ 21000-21002.) Under CEQA, all public agencies must use their regulatory authority to ensure *"that major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian."* (Public Resources Code §21000(g)).

One of CEQA's fundamental purposes is to inform decision makers and the public about potential significant effects of proposed projects. 14 CCR §15002(a)(1). To that end, CEQA establishes procedural and substantive requirements for Environmental Impact Reports. Whether environmental review of a project is sufficient under CEQA depends on whether the document meets those substantive and procedural requirements. The primary question is whether the document is sufficiently informative and the conclusions therein supported by substantial evidence. V.1

Based on our review of the EIR, we must conclude the EIR is plainly inadequate under the law. The EIR fails to comply with the letter and spirit of CEQA's provisions.

Cumulatively, the issues raised in these comments establish the need for substantial changes to the EIR. For example, the document contains many unsupported and unsubstantiated conclusions. Thorough analysis of project impacts and complete disclosure of the underlying basis for that analysis and the resulting conclusions is

required by law. Thus, substantial modification of the document is required, followed by recirculation of the EIR. The public is entitled to a clear description and explanation of the impacts associated with the Fourmile Hill project. The EIR, as written, does not meet CEQA's requirements and is legally vulnerable.

NOISE IMPACTS

EIR's SUPPORTING EVIDENCE FOR ITS CONCLUSIONS ABOUT PROJECT RELATED NOISE IMPACTS HAS BEEN IMPROPERLY OMITTED

A legally adequate EIR must contain sufficient detail to help ensure the integrity of the process of decisionmaking. *"The EIR must contain facts and analysis, not just the bare conclusions of a public agency. An agency's opinion concerning matters within its expertise is of obvious value, but the public and decision-makers, for whom the EIR is prepared, should also have before them the basis for that opinion so as to enable them to make an independent, reasoned judgment." (Santiago Water District v. County of Orange (4th Dist. 1981) 118 Cal.App.3d 818, 831.* V.2

Accordingly, this EIR is inadequate because most of the evaluation of noise impacts is unsupported by sufficient data and analysis within the EIR. Here are several examples:

p. 4-266, ¶2 The highest noise levels discernible at the Schonchin Picnic Area from the plant during operation and drilling is predicted to be 26.6 dBA L_{eq}. This prediction however is legally inadequate because it is merely conclusory without any supporting facts and analysis. Also, the EIR states this noise level is less than the Siskiyou County Noise Element's standard of 60 dB(A) L_{dn}, but the EIR misquotes the Noise Element's actual and significantly lower standard which, when adjusted with factors to account for the rural area's quiet, provides a standard of 40 dB(A) L_{dn}. V.3

¶2 The EIR also states that the plant's noise would not exceed the Federal noise limit of 65 dBA at 0.5 miles from the plant. However, no documentation of this conclusion is provided. No data and no calculations are evident in the EIR. V.4

¶3 The EIR concludes that during certain atmospheric conditions, the project noise will be slightly louder at sensitive receptor locations, estimating it to average about 30 dBA. However, this conclusion is not supported by any analysis in the EIR. Furthermore, it is unrealistic to think that noise levels only increase by that small increment under the worse atmospheric conditions. Since the DEIR states earlier that the *"highest noise level in the Schonchin picnic area is estimated to be about 27 dBA L_{eq},"* then when winds blow toward these receptors, the EIR's average estimate of 30 dBA is only about 3 dBA higher than otherwise. Other acoustical engineers estimate that wind direction alone can increase noise levels as much as 10 dBA. V.5

THE EIR'S DESCRIPTION OF EXISTING AMBIENT NOISE LEVELS IS INADEQUATE.

The EIR attempts to portray the existing low levels of noise in this project's area. This Medicine Lake area is profoundly quiet at times in that it is far from freeways and urban areas which produce noise that most of Californians are used to. The EIR only provides average sound level for existing conditions in the Medicine Lake area of between 33.0 to 37.0 dBA L_{eq}. These are apparently estimates of "ambient noise" including measurement of the louder daytime conditions. The EIR provides no measurements for existing noise levels at night though. Nighttime is when less vehicles, motorboats, and other activities typically create noise, and of course when people need adequate quiet to enjoy the reason they visit the area and to sleep. Nighttime measurements are critical to determine how much louder this 24 hour project will be than the existing background noise levels. In extremely quiet rural areas, where ambient noise measurements in the range of 20 - 25 dBA L_{eq} are common, the sound of people talking in normal voices 1/4 mile away is perceptible and sometimes even understandable. In that this project will be as loud as an automobile horn which doesn't shut off, and will operate 24 hours per day, a project like this will be very noticeable and annoying in that other noise sources may not exist to obscure it. The EIR thus fails to disclose sufficient information such that the public can evaluate the full impact of this project and other foreseeable geothermal projects in the vicinity. V.6

The EIR does not provide an accurate estimate for the existing loudness at night. It provides measurements of "Ambient Octave Band Sound Levels" which illustrate the loudness of existing noise at various frequency bands. But there is no indication of when these "brief samples" were taken. Presumably they were taken during the daytime. If so, then the ambient noise at night when vehicles, boats, and other noise producing human activity isn't as loud would be significantly quieter. The EIR however ignores such night measurements from which the public should be able to compare the sound of the proposed project.

EIR IS INADEQUATE FOR ITS FAILURE TO PROVIDE MEASUREMENTS OF NOISE OF ACTUAL FACILITY OPERATION OR CONSTRUCTION

The EIR assumes the loudness of a few noise sources on page 4-258, but omits some of the most important noise sources. It only estimates the noise of the operation of heavy equipment and transmission line construction equipment. It provides no figures for helicopter noise which it admits may result from the transmission line construction. Amazingly, no measurement nor assumption is provided in the EIR of the exterior noise level of the power plant itself, but this is what people are most concerned about! It also fails to include the noise from blasting during construction which the Forest Service has publicly acknowledged would likely occur. Without the EIR providing such information, neither the public nor reviewing agencies have any way to independently examine the EIR's unsupported conclusions. This V.7

failure to adequately describe the project's noise levels and thenceforth to disclose supporting documentation purportedly used in reaching conclusions clearly violates CEQA. The EIR essentially asks the public to trust its conclusions without providing any way to independently check them.

The EIR outright ignores helicopter noise because it claims that such noise levels are "speculative at best." This is total nonsense. The noise from helicopters is easily measured. If a specific type of helicopter hasn't yet been selected, then the EIR could reasonably use the worse case scenario among the likely types of helicopters used in such construction. If the noise impacts of helicopter use would be significant, then the EIR could suggest mitigations such that only a quieter helicopter is used, or that the flight path of helicopters not pass within a specified minimum distance of sensitive receptors. However, the EIR cannot legitimately dispose of its responsibility to examine and disclose such noise levels, nor to examine other construction alternatives in which helicopters aren't used. Without such information in the EIR, all the values provided in Table 4.14-1 are meaningless and greatly underestimated. CEQA requires that such information be disclosed even if it means that the noise consultant retained for this EIR actually has to do the homework, leave his office, go to an airport and take such measurements. V.8

NOISE CALCULATIONS ARE FLAWED

EIR claims that it uses measurements from other sites, and mathematically predicts noise loudness at receptor locations in this area. The EIR's noise analysis is flawed because that doesn't account for unique characteristics of the Medicine Lake geography however. Nearby mountains tend to reflect and increase noise levels and actually surround Medicine Lake, the proposed geothermal plant, and neighboring sensitive receptor locations. Medicine Lake also, with its smooth water surface, allows sound to travel (without the typical noise attenuation losses) greater distances than are calculated. Everyone knows that sound travels much farther over water. The EIR's assumption that noise is attenuated 6 dBA for each doubling of distance is therefore inappropriate over open water in consideration of receptors on the other side of the lake. V.9

The EIR accordingly should not be based upon mere rules of thumb and theoretical calculations. Instead, the EIR's analysis should be derived from actual tests in this project's vicinity. It is not unreasonable, unrealistic nor expensive to simulate the noise loudness of this proposed geothermal facility by some other means, and actually measure the resultant noise levels at the homes and recreational facilities in question. The Siskiyou County General Plan even notes that actual noise measurements are sometimes needed rather than have the evaluation rely upon a simple value found in it: V.10

> "The following land use criteria are provided as the required response mechanism to the question "Is the projected noise effect

> of this project acceptable and in conformance with the General Plan?" In some instances reference to noise contour maps and equal noisiness zones will not provide the specific answer. It may be necessary to ask an applicant to provide noise readings, either as part of the environmental review process or an independent request through an appropriate mechanism (e.g., by ordinance or adopted standards for plan submission) or for the county staff to undertake specific noise recordings." *(emphasis added)* Siskiyou County General Plan Noise Element (p. 53)

For example, such test noise could have been simulated with large loudspeakers using representative frequencies in recordings from other geothermal plants. To do so would more accurately predict the real noise impact upon this unique environment. Now however some of the public is left wondering why such a simple testing procedure wasn't done? Is the EIR attempting to hide the project's real impacts? By not having heard such a test, those members of the public who use or live in the area have had no advance warning on an experiential level of the real impact that people may soon be exposed to.

The EIR is based upon a stated expectation that construction will be limited to the daytime hours. As such, its conclusions are flawed. This project will be noisy 24 hours a day, seven days a week, for many months for each well. Some construction occurs at night, especially when scheduling pressures mandate it. The EIR doesn't even define those hours nor incorporate them into any mitigations as limitations. During summer months with early sunrises and hot midday temperatures, construction crews often like to begin noisy activities well before people in a recreational area even awake. Noise occurring at such early hours, especially before 7 am, would be much more of a significant environmental impact than this EIR apparently considers. V.11

EIR USES INCORRECT NOISE STANDARDS FROM SISKIYOU COUNTY GENERAL PLAN

The EIR mistakenly minimizes the real impact of this project during operations with miscalculation and misstatement of local regulations.

> "Noise associated with wellfield and power plant operation could result in significant impacts if users of forest lands are exposed to operational noise in excess of the Siskiyou County noise compatibility standard of 54 dBA L_{eq} (60 L_{dn}.). An exceedance of this standard could occur within approximately 3,200-feet of the wellfield and power plant site." V.12

This conclusion is not supported by any calculation in the EIR. Furthermore, it is somewhat inaccurate if based upon a 6 dB reduction for every doubling of distance, and critically flawed when based upon a misreading of the Siskiyou County Noise

Element. The 54 dBA noise contour would occur 3,400 feet away, and not 3,200 feet away:

LEVEL:	DISTANCE:	
66 dBA	850 feet	(quoted from EIR, p. 4-261, ¶3)
60 dBA	1700 feet	
54 dBA	3400 feet	0.64 miles
48 dBA	6800 feet	1.3 miles
42 dBA	13600 feet	2.6 miles
36 dBA	27200 feet	5.2 miles

Also, the value of 54 dBA is not Siskiyou County's noise compatibility standard upon which a significant impact should be rated. Rather, it is significantly lower than that in this quiet Medicine Lake rural area which is remote from large cities and from industrial activity and trucking. The County's Noise Element provides values, when adjusted, would be only about 40 dBA, as referenced below. This significant noise impact could occur as far away as 3 miles from the geothermal plant. There are homes closer to the plant than that at 2.2 miles according to the EIR which would therefore be exposed to significant levels of noise. This doesn't take into account the before mentioned unique features of the project vicinity which increase those noise levels even more.

THESE ARE THE SISKIYOU COUNTY GENERAL PLAN NOISE STANDARDS :

Noise Element Appendix p. 12 — Table A-6: "Noise level identified as requisite to protect the public health and welfare with an adequate margin of safety."

Outdoor activity: **55 dB(A)** L_{dn} "Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use."

55 dBA L_{dn} outdoor activity interference and annoyance.

Table A-10: "Corrections to be added to the measured community noise equivalent level (CNEL) to obtain normalized CNEL":

"Correction for Outdoor Residual Noise Level": (for summer operation) Quiet suburban or rural community (remote from large cities and from industrial activity and trucking). +10 dB CNEL

Type of correction	Description	Amount of correction to be added to Measured CNEL in dB
Correction for Outdoor Residual Noise Level	Quiet suburban or rural community (remote from large cities and from industrial activity and trucking).	+10 (dB)
Pure tone or impulse	... impulsive character present.	+5 (dB)

Besides the addition of +10 dB, the impulse sound adjustment factor of another +5 dB must also be included. The EIR identifies that there will be project generated noise of an impulsive character: *"The clanging of drill pipes and highpressure air releases are expected to be audible."* (EIR p. 4-260)

Therefore, because this is a quiet community and the project's noise will have an impulsive character capable of creating greater annoyance, the Siskiyou County General Plan Noise Element requires that 15 decibels be added to the EIR's estimated noise levels before those figures are compared with the Noise Element's other standards. The other standard shown above is 55 dBA L_{dn}, not 60 dBA L_{dn} as the EIR misquotes. Subtracting the correction factor, the correct measurement for General Plan compliance should have been: (55 - 15 =) 40 dB(A) L_{dn}. The EIR's purported limit of 60 dB(A) L_{dn} is approximately 4 times louder and less restrictive than the Siskiyou County Noise Element's limit of 40 dB(A) L_{dn}, based upon the general theory that a 10 dB increase in noise level is perceived as a doubling in loudness. If the EIR overestimates these limits fourfold, then much reliance on its other conclusions is lost also.

THE EIR'S PREDICTION OF NOISE IMPACTS UNDERESTIMATES THE TRUE IMPACTS BECAUSE IT ONLY CONSIDERS THE "A-WEIGHTED" NOISE SCALE AND OMITS SIGNIFICANT LOWER FREQUENCY POWER PLANT NOISE

The discussion in the EIR of how a certain frequency of sound was considered is inadequate for the nature of the project at hand. It is true that people are more sensitive to noises in the "A"-weighted frequency range of 1000 hz to 4000 hz, but that doesn't mean that lower frequency sounds should be discarded from consideration. Industries like these power plants often produce much of their noise at frequencies less than 500 hz. The EIR even provides evidence of that when it estimates that over 40 dB of noise would are expected at the low end of the frequency scale. (Table 4.14-2) The "C"-weighted scale takes into account those frequencies down to 50 hz where much industrial noise is generated. Noise level meter readings on the "C"-weighted scale can often be 8 dB louder than those on the "A"-weighted scale as presented in this EIR! V.13

The booming sound of heavy equipment can greatly impact nearby residences and campgrounds. Homes and campers often are constructed with lightweight wooden walls and thin windows which are not good at blocking low frequency sounds.

This project is apparently required to comply with County regulations, but sometimes state environmental regulations turn out to be even stricter in protecting neighboring residential uses. The County's General Plan may, according to the EIR, regulate noise levels based upon the "A"-weighted noise scale /1/.

1/ The "A"-weighted noise scale emphasizes noise in the 500-20,000 Hz frequency range, while the "C"-weighted noise scale more broadly covers the lower frequency 50-20,000 Hz range where much noise will be generated.

However, CEQA requires full evaluation of adverse noise impacts on people who are also sensitive to lower noise frequencies not counted on the "A"-weighted scale. The "C"-level scale is more appropriate for certain industrial uses which generate significant noise levels in frequency ranges below 500 Hz which are capable of inducing vibration in buildings, such as this geothermal facility demonstrably does.

However, this EIR largely dismisses the lower frequency sound energy measurements which would be counted if the "C"-weighted scale was used but for no good reason! In so doing, the EIR underestimates the real noise impact upon neighboring residents. It matters little that the "A"-weighted scale is used in most ordinances when a specific industrial facility generates loud, low-frequency noise levels not included in that "A"-weighted scale.

CUMULATIVE IMPACTS OF MULTIPLE GEOTHERMAL POWER PLANT NOISE SOURCES WILL BE SIGNIFICANT BUT THE EIR FAILS TO ADEQUATELY DISCLOSE THOSE IMPACTS

CEQA requires the cumulative impacts of other foreseeable geothermal power plants to be discussed and analyzed in this EIR. While the EIR discloses the Telephone Flat geothermal power plant currently under environmental review, it makes no mention of the nearby propose Mt. Hoffman geothermal power plant which is on the drawing board and is also under consideration. As such, this EIR is inadequate.

> *CEQA Guidelines § **15130. (b)***
> *The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided of the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness. The following elements are necessary to an adequate discussion of cumulative impacts:*
>
> *(1) Either: (A)A list of past, present, and **reasonably anticipated future** projects producing related or cumulative impacts, including those projects outside the control of the agency, ...*
>
> *(2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available, and*
>
> *(3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable options for mitigating or avoiding any significant cumulative effects of a proposed project.*

V.14

The EIR indicates that the noise levels from various sensitive receiver locations, as measured in L_{eq} equivalent values from this plant at the homes on the southeast side of Medicine Lake would have these values:

EIR'S PREDICTED NOISE LEVELS FROM FOURMILE HILL POWER PLANT

	Well Drilling	Plant Operations	Drilling and Plant
1. North Campgrounds	25 dB L_{eq}	13 dB L_{eq}	25.3 dB L_{eq}
2. Homes at SE end of Medicine Lake	20 dB L_{eq}	11 dB L_{eq}	22.3 dB L_{eq}
4. Schonchin Picnic Area	26 dB L_{eq}	18 dB L_{eq}	26.6 dB L_{eq}

If the Fourmile project produces a sound level of 26.6 dBA at 2.2 miles, then it is reasonable to assume that the similarly sized Telephone Flat Geothermal Plant might also produce the same amount of noise at that distance. It would produce at least 6 dBA more noise at half that distance of 1.1 miles, which would be at least 32.6 dBA. This calculation is based upon the EIR estimation of a 6 dBA increase for each halving of distance for lack of any better actual measurements in the EIR.

V.15

The EIR states that Telephone Flat Geothermal Plant will be about 1.5 miles southeast of Medicine Lake. Inconsistently however , the EIR map (Figure 4.17-1) shows that Telephone Flat Geothermal Plant and wellfield to be only about 6,000 feet or 1.1 miles to the east from the nearest cabins on the east side of Medicine Lake. This error in the EIR should be corrected. Moreover, behind the Telephone Flat Geothermal Plant is a prominent mountain slope which would tend to amplify facility noise by reflecting it westwards towards Medicine Lake. Those errors in the EIR tend to falsely minimize the impacts of this cumulatively foreseeable geothermal plant project.

The location of a third power plant — the proposed Mt. Hoffman Geothermal Power plant apparently now on the drawing boards — is not disclosed in the EIR. It however has been disclosed in open discussion with government officials. However, the USGS maps of the area indicate two geothermal wells in the vicinity of Mt. Hoffman. (see attached map, previous page, Exhibit "A") For lack of any more accurate information from the BLM, the USFS or the private companies involved, either one of these Mt. Hoffman locations is about equidistant from the group of sensitive noise receptors around Medicine Lake. They are about 2.0 miles from the center of Medicine Lake itself. Until more accurate information is made public, we will assume that one of these designated geothermal wells is the site of the proposed Mt. Hoffman power plant currently being designed.

V.16

The cumulative impacts of all three of these geothermal plants, when in operation at the same time, appear to be significant. The EIR is silent on the magnitude of such cumulative impacts however. Using the little data which is available, and applying the standard distance attenuation principles used in the EIR, along with standard calculational means to add cumulative noise levels together, we have compelling evidence that their combined noise levels would be in excess of Siskiyou County Noise Element limits for this quiet, rural community. Without a doubt, their combined noise limits would be significantly louder than the existing quiet ambient noise levels. The EIR fails to adequately analyze this cumulative increase in noise levels.

All we know from reading the EIR is that, for example, at the northern campgrounds, the current ambient noise levels without this project are about 37.0 dBA L_{eq}. This is a 24-hour average which doesn't numerically describe the louder daytime levels nor the quieter nighttime levels. Conceivably, this area could be as quiet as 20 dBA at nighttime when activity isn't occurring, but the EIR doesn't give us that measurement. The EIR only estimates a range of 20 - 30 dB under such circumstances when people aren't present. Estimations aren't as valuable as measurements, but then again, if the EIR was attempting to underplay the true impacts of this project actual measurements could give that ruse away. This area is quiet because there are no freeways nor railroads nearby to raise these extremely quiet ambient noise levels unlike in most other parts of the state. Therefore, any constant noise increase from these power plants of more than about 5 dB above those nighttime quiet levels would be discernable and objectionable. An increase of more than 10 dBA should be identified as "significant." Remember, it matters not that the average noise level portrayed in the EIR may be 37.0 dB if people are trying to sleep or enjoy a night sky when the noise levels are in the mid 20 dB's; they will be greatly annoyed by the intrusive sounds of these projects which could be significantly higher. V.17

So the question remains, how much higher will the noise levels be when the power plants are operating and drilling is occuring than these current quiet nighttime conditions? The EIR fails to answer this critical question. We will attempt to provide an answer, based upon what has so far been revealed. The important point is that even with what is known, the calculations reveal that these cumulative projects' noise levels will be noticeably greater and a significant environmental impact for which this EIR offers inadequate mitigation. The calculations below show that these cumulative all-day, all-night impacts could be as much as perhaps 20 dBA greater than existing noise levels at nighttime! Such industrialization of a peacefully quiet community must be disclosed in the EIR, yet it hasn't been done yet. V.18

ESTIMATION OF OTHER POWER PLANT NOISE LEVELS
AS HEARD AT MEDICINE LAKE SENSITIVE LOCATIONS

It is possible to roughly estimate the loudness of the other foreseeable geothermal plants as heard at various points around Medicine Lake based upon what the EIR

has disclosed about the Fourmile Hill project. The public would have an easier time independently examining such related impacts if the EIR preparer had provided the actual measurements of a facility such as is proposed... and as CEQA requires. Perhaps those actual measurements were deliberately omitted to obscure the full impact of this project? Baring such solid measurements though, these foillowing calculations will have to suffice.

The loudness of a given noise source as calculated at a different location can be estimated by this standard acoustical formula:

$$dB2 = db1 - 10 \times a \times \text{Log}(R2 \div R1)$$

dB1: original noise measurement
dB2: calculated noise level at different location
a: factor to account for characteristics of noise source and intervening territory
R1: original distance
R2: new distance

The locations of both the second Telephone Flat Geothermal Plant and the assumed location for the third Mt. Hoffman Geothermal Plant are shown on the attached map. The distances to sensitive receptors around Medicine Lake was taken from this map. Then using the formula above, noise levels were calculated of each during operation and drilling using the information from this EIR and are shown below:

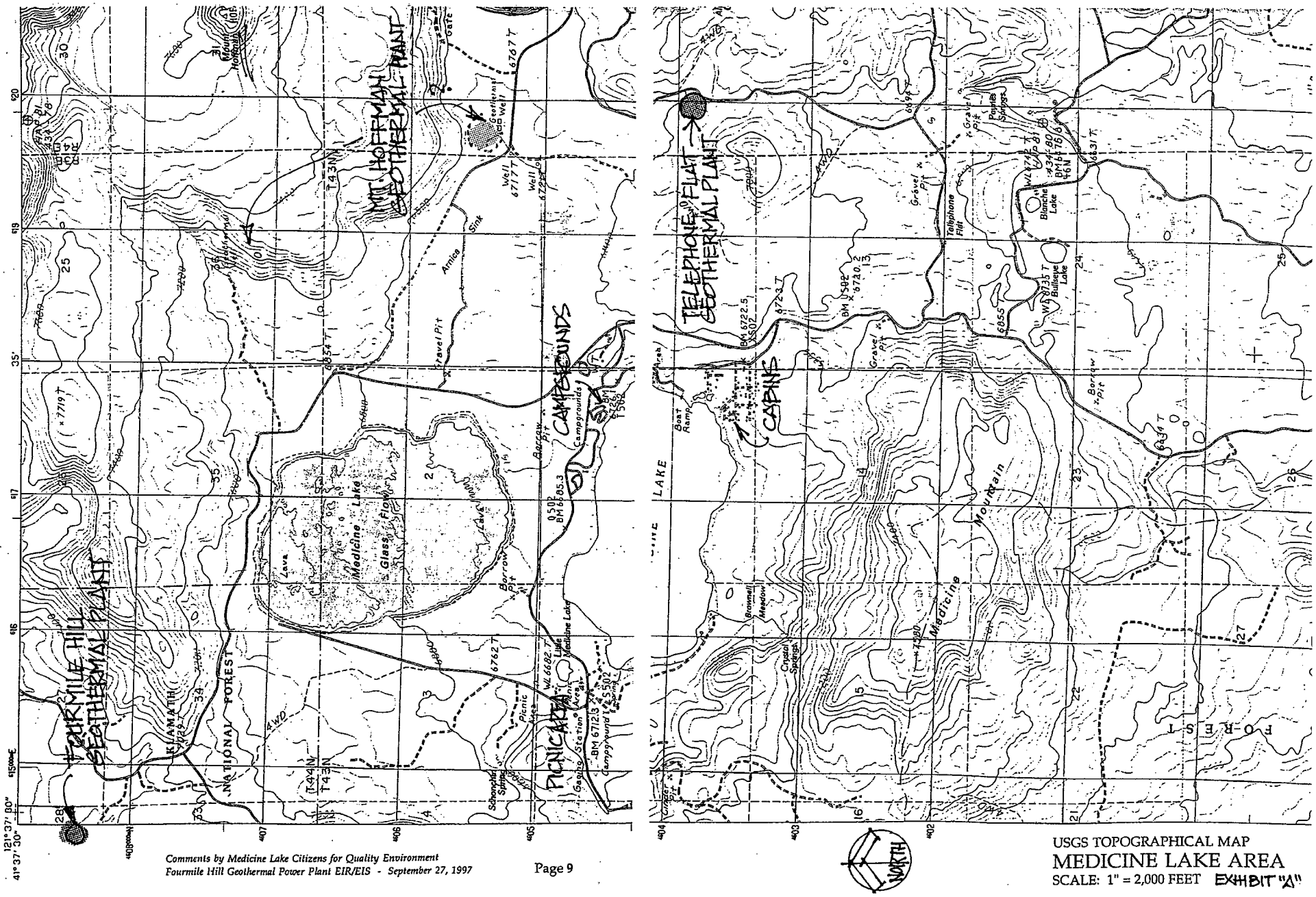
CUMULATIVE NOISE LEVELS FROM DRILLING AND OPERATION
(in decibels (dBA), both L_{eq} as used in EIR and L_{CNEL} — (Day-Night Average) as used in General Plan, which are typically 6 to 7 dB higher)

(Not including helicopter noise, construction noise, sound reflections off nearby mountain slopes, increases in noise travel over open water, and the louder "C"-weighting scale to account for low frequency of geothermal power plant noise and lesser atmospheric attenuation)

	Fourmile Hill Geothermal Plant's Noise	Telephone Flat Geothermal Plant's Noise	Mt. Hoffman Geothermal Plant's Noise	Cumulative Noise (of all 3 power plants)
1. NorthMed.Lake Campgrounds	25.3 (@ 2.8 miles)	32.6 (@ 1.1 miles)	32.6 (@ 1.1 miles)	36.0 L_{eq} **42.7 L_{CNEL}**
2. Homes at SE end ofMedicine Lake	22.3 (@ 3.5 miles)	32.6 (@ 1.1 miles)	29.9 (@ 1.5 miles)	34.7 L_{eq} **41.4 L_{CNEL}**
4. Schonchin Picnic Area	26.6 (@ 2.2 miles)	25.1 (@ 2.6 miles)	25.1 (@ 2.6 miles)	30.4 L_{eq} **37.1 L_{CNEL}**

NOTE: The L_{CNEL} noise measurements include an adjustment adding 5 dB for the hours from 7 pm to 10 pm and adding 10 dB from 10 pm to 7 am to account for increased noise sensitivity during evening and nighttime hours.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



USGS TOPOGRAPHICAL MAP
MEDICINE LAKE AREA
SCALE: 1" = 2,000 FEET EXHIBIT "A"

What is striking about these calculations is that Medicine Lake will be exposed to even louder noise levels from the second Telephone Flat Geothermal Plant which will be closer to it than the current one. The EIR should have revealed this but didn't. By not disclosing it in this EIR, it appears that the private companies or the Lead Agency is attempting to get a foot in the door, and then once some noise increases are already approved, introduce even louder ones later. This may be true also for the Mt. Hoffman geothermal plant. For example, the campgrounds at the northeast side of Medicine Lake may be exposed to as much as 25.3 dBA from the Fourmile Hill plant, but as much as 32.6 dBA from either of the 2nd or 3rd power plants. Either of them will sound more than twice as loud from the campgrounds as the Fourmile Hill plant will. Why wasn't this disclosed?

CUMULATIVE ADDITION OF NOISE LEVELS

Once the loudness of each is determined, then they can be "added" together to figure out how loud all three power plants will be if drilling wells and operating at the same time. The fourth column above adds cumulatively the noise levels from each of these three proposed power plants, using this common acoustical formula:

Cumulative dB = 10 x log [10 EXP(0.1 x dB1) + 10 EXP(0.1 x dB2) + 10 EXP(0.1 x dB3)]

Values of us to 36 dBA L_{eq} are estimated therefore from these cumulative noise levels. Even as to instantaneous measurements, 36 dBA would be significantly louder than the current mid to low 20's dBA currently existing. This increase would constitute a significant cumulative environmental impact and should have been disclosed in this EIR.

EIR UNDERESTIMATES THE TRUE IMPACT OF PROJECT NOISE LEVELS

Even more distressing is the evidence that the EIR has again understated the true significance of the predicted noise levels by confusing two different noise level measurement methods. The EIR presents noise levels in decibels as L_{eq} measurements, rather than as L_{dn} or L_{cnel} measurements which the Siskiyou County General Plan uses for comparison to its standards. L_{eq} measurements are defined in the EIR (p. 3-195, Table 3.14-2 note #2) as being 24-hour average hourly measurements. The EIR however confuses L_{eq} and L_{dn} measurements by stating that L_{eq} measurements have a +10 dB weighting applied to them when that isn't the convention. Otherwise, if they have the same value at this EIR states, then why differentiate between L_{dn} and L_{eq} measurements? To the contrary , for a given constant 24-hour noise source like these power plants, the Day-Night average measurement L_{dn} will be approximately 7 dBA louder than the L_{eq} measurements presented in this EIR to account for increased nighttime sleep disturbance quality of night noise. CNEL (Community Noise Equivalent Level) values, as used in the Siskiyou County General Plan Noise Element, are typically in this quiet area about 0.2 dBA higher than L_{dn} values, and these values were used above. As a result,

V.19

before the EIR's L_{eq} values can be compared to the Siskiyou County General Plan standards, they have to be adjusted to Day-Night average L_{cnel} measurements by adding what works out to be 6.7 dBA to each. This adjustment is shown in the above table's fourth column.

The campground and the cabins at the east side of Medicine Lake may therefore be exposed to 42.7 and 41.4 dBA L_{cnel} levels of noise, which exceeds the General Plan's 40 dBA L_{cnel} standards after adjustment for this quiet rural setting as referenced above. Therefore, if the cumulative impacts of all three power plants would create noise levels in excess of the General Plan standards, this would be a significant environmental impact which requires disclosure and mitigation. The EIR fails to do this and is therefore legally inadequate.

V.20

EVEN CUMULATIVE IMPACTS OF JUST TWO PLANTS --- THE FOURMILE HILL AND TELEPHONE FLAT GEOTHERMAL PLANTS --- WILL BE SIGNIFICANT

Even if the Mt. Hoffman power plant or other yet undisclosed power plants aren't built, the cumulative impacts of both the Telephone Flat Geothermal Plant and the Fourmile Hill plant will create noise levels which exceed the Siskiyou County General Plan Noise Element's adjusted acceptable value of 40 dB(A) L_{cnel} for some locations of sensitive receivers. In particular, the campgrounds at the north side of Medicine Lake will be exposed to in excess of 40 dB(A) L_{cnel} when both power plants are operating and drilling wells, as shown in the following table:

CUMULATIVE NOISE LEVELS FROM DRILLING AND OPERATION
(in decibels (dBA), both L_{eq} as used in EIR and L_{CNEL} --- (Day-Night Average) as used in General Plan, which are typically 6 to 7 dB higher)

V.21

(Not including helicopter noise, construction noise, sound reflections off nearby mountain slopes, increases in noise travel over open water, and the louder "C"-weighting scale to account for low frequency of geothermal power plant noise and lesser atmospheric attenuation)

	Fourmile Hill Geothermal Plant's Noise	Telephone Flat Geothermal Plant's Noise	~~Mt. Hoffman Geothermal Plant's Noise~~	Cumulative Noise (of both power plants)
1. NorthMed.Lake Campgrounds	25.3 (@ 2.8 miles)	32.6 (@ 1.1 miles)		33.4 L_{eq} **40.1 L_{CNEL}**
2. Homes at SE end ofMedicine Lake	22.3 (@ 3.5 miles)	32.6 (@ 1.1 miles)		33.0 L_{eq} **39.7 L_{CNEL}**
4. Schonchin Picnic Area	26.6 (@ 2.2 miles)	25.1 (@ 2.6 miles)		28.9 L_{eq} **35.7 L_{CNEL}**

NOTE: The L_{CNEL} noise measurements include an adjustment adding 5 dB for the hours from 7 pm to 10 pm and adding 10 dB from 10 pm to 7 am to account for increased noise sensitivity during evening and nighttime hours.

The EIR also fails to disclose or analyze just these two power plants' cumulative noise levels. At the campgrounds, their combined totals appear to be inconsistent with the General Plan's 40 dBA limitation.

It should be further noted that if the proper "C"-weighted noise scale had been used in the EIR or in the above calculations, these predicted cumulative totals would be about 7 dB higher yet, not including geographic characteristics which could increase the noise levels even further.

Clearly, the EIR underestimates the total impact of these projects, and in doing so, violated CEQA requirements.

AIR QUALITY IMPACTS

EIR'S DELEGATION OF "LEAD AGENCY" RESPONSIBILITY TO THE AIR POLLUTION CONTROL DISTRICT IS LEGALLY FLAWED.

This EIR is seriously flawed because it designates a legally inappropriate and functionally inadequate agency (an Air Pollution Control District) to act as the Lead Agency for CEQA purposes. This procedural error undermines CEQA's protective purpose by designating such authority to an agency with too narrow a focus and a history of total disregard for CEQA regulations. The EIR states that *"The **Siskiyou County APCD** is acting as the lead agency under CEQA, and as such will ensure compliance with CEQA process requirements."* (p. 1-8) This assurance is not worth the ink it was printed with. This Air Pollution Control District cannot effectively assume that position as a Lead Agency for many reasons:

- CEQA Guidelines § 15051(b)(1) expressly states that an air pollution control district is not to be a Lead Agency because it has only a limited purpose. See the footnote below for statutory regulation prohibiting such a designation. /2/

2/ **15051.** "Where two or more public agencies will be involved with a project, the determination of which agency will be the Lead Agency shall be governed by the following criteria:

"(b) If the project is to be carried out by a nongovernmental person or entity, the Lead Agency shall be the public agency with the greatest responsibility for supervising or approving the project as a whole.

"(1) The Lead Agency will normally be the agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose such as an **air pollution control district** or a district which will provide a public service or public utility to the project. " *(emphasis added)*

- The APCD, in not having general governmental powers, can not enforce CEQA requirements.
- The APCD could never be a Lead Agency on any project involving just CEQA issues; therefore it is inappropriate to expand its powers in a joint EIR/EIS preparation.
- The Siskiyou County APCD has never before enforced CEQA requirements.
- It has no staff members who have any experience with CEQA.
- Leaving the regulation of air quality impacts from a polluting geothermal industry to this particular Siskiyou County APCD is like allowing a fox to guard the chicken coop. This Siskiyou County APCD has dismissed its two previous Air Pollution Control Officers for attempting to do their jobs properly and uphold state air pollution regulations.
- This Fourmile Hill geothermal project is predicted to emit noxious H_2S odors, but the Siskiyou County APCD claims its hands are tied and it accordingly doesn't enforce any regulations against odor emissions.
- The APCD's functions are too narrow to uphold the broad range of CEQA requirements as a Lead Agency does. For example, this geothermal project will also cause significant noise impacts that are inconsistent with the Siskiyou County General Plan Noise Element, but the APCD has no regulatory authority over noise impacts. /3/ The Siskiyou County APCD is only a Responsible Agency. /4/
- This APCD has a history of total disregard for CEQA, in that it fails to even notify the appropriate Siskiyou County departments when private entities apply to it for discretionary air quality permits. Moreover, it doesn't notify adjacent or nearby neighbors of such private entities when it receives applications.
- This APCD is entirely incapable of handling citizen complaints about illegal permits it issues, recently having argued that only the permitted industries it

V.22

3/ CEQA Guidelines **15042.** "A public agency may disapprove a project if necessary in order to avoid one or more significant effects on the environment that would occur if the project were approved as proposed. A Lead Agency has broader authority to disapprove a project than does a Responsible Agency. A Responsible Agency may refuse to approve a project in order to avoid direct or indirect environmental effects of that part of the project which the Responsible Agency would be called on to carry out or approve. For example, an air quality management district acting as a Responsible Agency would not have authority to disapprove a project for water pollution effects that were unrelated to the air quality aspects of the project regulated by the district." *(emphasis added)*

4/ CEQA Guidelines **15041.** "Within the limitations described in Section 15040: (a) A Lead Agency for a project has authority to require changes in any or all activities involved in the project in order to lessen or avoid significant effects on the environment. (b) When a public agency acts as a Responsible Agency for a project, the agency shall have more limited authority than a Lead Agency. The Responsible Agency may require changes in a project to lessen or avoid only the effects, either direct or indirect, of that part of the project which the agency will be called on to carry out or approve.

regulates have the right to appeal its decisions, without extending that right to the very citizens it is supposed to protect.

- The Siskiyou County APCD is the same agency which has allowed the J. F. Shea Co., Inc. asphalt batch plant to greatly pollute its surrounding rural community of Gazelle now for years with little enforcement or concern for air quality. Vast clouds of dust and toxic substances are emitted on a regular basis from that greatly underregulated industry in spite of vocal citizen complaints.
- This APCD is so understaffed that it has only one Air Pollution Control Officer and a secretary for an entire county. Entrusting the APCD to enforce CEQA requirements as a Lead Agency is but a sham because, without massive funding and overhauling, it would never have the ability to carry out that responsibility with so little manpower, even if it had broader regulatory authority and a sympathy towards CEQA concerns.

In *Citizens for Quality Growth v. City of Mt. Shasta (1988) 198 Cal.App. 3d 418* the court held that a lead agency may not refuse to exercise its police powers to try to mitigate significant environmental effects of a project simply because another agency may also have the power to do so. Allowing the Siskiyou County APCD to be identified as a Lead Agency when it has no intention nor power to regulate significant odor impacts, or even worse, refuses to, is contrary to this court decision.

The EIR's apparent designation of the APCD as a Lead Agency derives from a misreading of CEQA Guidelines § 15051(d):

> *(d) Where the provisions of subsections (a), (b), and (c) leave two or more public agencies with a substantial claim to be the Lead Agency, the public agencies may by agreement designate an agency as the Lead Agency. An agreement may also provide for cooperative efforts by two or more agencies by contract, joint exercise of powers, or similar devices.*

Nothing in this section allows an APCD to be elevated to the status of an agency with the general governmental powers from which a Lead Agency is to be chosen. This EIR must therefore be revised to designate the proper agency to act as a Lead Agency for CEQA purposes.

APCD's HISTORY OF CEQA ENFORCEMENT WILL COME BACK TO HAUNT THE DISTRICT IF NOT THE AFFECTED CITIZENS OF THE MEDICINE LAKE AREA

To evaluate how effective proposed mitigations limiting air pollution impacts will be, one only need review the Siskiyou County Air Pollution Control District's recent history to see that the public can't take any such mitigations seriously. In 1995, for the J. F. Shea Co., Inc. asphalt batch plant site near Gazelle, California, a new company approached this APCD. International Surfacing, Inc. requested an Air Quality Permit for installation of rubberized asphalt equipment not listed in Shea's existing Use Permit. That equipment emitted hazardous quantities of foul smelling V.23

burnt rubber odor from crumbed rubber heated to nearly 400°F which was being added to the asphalt. The APCD however never notified the Siskiyou County Planning Department of this substantial change in the project as is required under local and state law. Nor was any environmental review pursuant to CEQA requirements ever undertaken of such project changes by the APCD or the County, nor was any Notice of Exemption from environmental review ever issued. Instead, the APCD quietly issued an Air Quality Permit without even notifying the neighboring residents. That permit contained no prohibitions to limit the foul smelling, toxic odors emitted from that rubber-melting equipment.

When neighboring residents accidentially discovered this significant change in the project, they appealed the issuance of the Air Quality Permit to the Hearing Board of the APCD according to the District's own rules. They filed in a timely way and paid the required appeal fee. However, their appeal was denied by the Air Pollution Officer. He never allowed the Hearing Board to even review his illegal actions. The Hearing Board for that matter had never been convened for the preceeding 7 years so effectively there is no administrative recourse when rules are violated. Not only was the APCD unwilling to uphold CEQA regulations, but it also refused to abide by its own regulations. The only recourse for Gazelle citizens was to take the Air Pollution Control District to court where that issue is still being reviewed.

With this recent example of another polluting Siskiyou County industry being allowed carte blanche permission to harm surrounding residential areas with its excessive air pollutants, the public cannot take seriously any claim in the EIR that enforcement of mitigations by the Siskiyou County APCD will lessen the Fourmile Hill air quality impacts to less-than-significant.

THE EIR FAILS TO CONTAIN EVEN THE FEW
AIR POLLUTION MITIGATIONS REQUESTED
BY THE AIR POLLUTION CONTROL DISTRICT

This project is predicted by the EIR to emit about 7.2 tons per year of hydrogen sulfide gas, smelling like rotten eggs, which as a light gas would occupy a very large volume. The Siskiyou County Air Pollution Control District wrote a letter stating that the Fourmile Hill EIR didn't adequately control emissions. (See APCD's letter dated February 3, 1997 to Calpine attached hereto as Exhibit "B") It therefore recommended expanding the "mitigation segment" of the EIR by adding measures to be imposed within the permit to operate. It included the following mitigations, but none of these were ever added to the EIR as mitigations! A statement in the EIR that Calpine has indicated that they will comply with these conditions simply isn't equivalent of actual CEQA mitigations; nothing yet provided prevents Calpine from changing its mind. As such, the public has no way of knowing that these mitigations will in fact later be adopted as conditions of permit approval. V.24

- The Siskiyou County APCD requested a mitigation limiting hydrogen sulfide emissions from any single well operation to not exceed 10.0 lbs./hr. That mitigation was never added to the EIR.

- The Siskiyou County APCD also requested a mitigation controlling hydrogen sulfide emissions by *"injection of hydrogen peroxide and/or sodium hydroxide into the blooie line."* That mitigation was never added to the EIR either.

- The Siskiyou County APCD requested a third mitigation controlling hydrogen sulfide emissions from the power plant to not exceed 50 grams/MwHr. That mitigation was never added to the EIR either. As a result, even if it were actually imposed, the EIR fails to contain <u>any</u> quantitative mitigations limiting hydrogen sulfide emissions from the power plant operation!

- The Siskiyou County APCD also requested a mitigation that stated: *"The plant shall install a turbine bypass to reduce emissions during startup, shut down, and upset conditions. The bypass will direct the steam around the turbine, through the main condenser, and on to the primary H_2S abatement system prior to venting."* That mitigation was never added to the EIR either.

If this is any measure of the effectiveness of the Siskiyou County APCD in implementing CEQA requirements, then its failure to insure adequate mitigation in the EIR is just a foreshadowing of its future ineffectiveness in protecting the surrounding area from this power plant's air pollution.//Moreover, when other proposed and likely geothermal power plants are in operation, the cumulative impacts of their emissions may be even greater, but the EIR doesn't consider those cumulative impacts. V.25

Finally, it is strange that the Siskiyou County Air Pollution Control District is to be considered a Lead Agency when it has apparently received so little correspondence from the Bureau of Land Management or the Forest Service as apparently only two letters! The citizens group Mt. Shasta Tomorrow filed a Freedom of Information Act request dated September 3, 1997 for *"copies of any correspondence in your agency's possession between the USFS or any other agencies or the company involved in this project and the Siskiyou County Air Pollution Control District."* In response, the only two letters received were one letter dated September 16, 1996 from the APCD to the USFS/BLM, and one letter dated February 5, 1997 from the APCD to Calpine. One would think that a purported "Lead Agency" would have been at least <u>sent</u> some correspondence! The only evidence the APCD received anything is a notation about a scoping report typically provided to Responsible Agencies. Either that FOIA request was not legally responded to in full, or the APCD has been nearly totally left out of the environmental review process. Guessing that your staff has not risked violation of the stringent FOIA requirements, it is apparent that the Siskiyou County Air Pollution Control District can not be assigned the job as Lead Agency for CEQA review because it has already been excluded from much of that role, as well as the above issues. V.26

MITIGATION MEASURES WHICH ARE PROVIDED
ARE LEGALLY INADEQUATE

Mitigation measure 4.13.2a is legally defective in deferring to some later time the determination of the schedule for monitoring and the allowable limit for emissions. It essentially allows the APCD to either monitor this facility or not depending upon its staff budget, personnel availability, or some other unstated reason. If the emissions exceed some presently undisclosed limit; then the mitigations states the APCD *"<u>could</u> require compliance with the emission limitation,"* but by the same token it *could* also not require compliance. What protection does the public have from some ill-defined mitigation written so loosely that it isn't even mandatory? How is the public to be able to independently evaluate at this brief opportunity for review if that "mitigation" will ever be effective or not? Moreover, when the APCD is considered the Lead Agency for CEQA review, effectively policing itself or not if it wishes with such poorly written mitigations, where will the public turn to if this project's air pollutants overwhelm them? V.27

Similarly, mitigation measure 4.13.5b is legally defective in deferring to some later time the determination of additional mitigation measures during operation of the power plant. If such mitigation measures are later determined to be needed, but after the conclusion of this limited public review period, the public will be denied its right under CEQA to examine such mitigation measures for their effectiveness. V.28

THE EIR'S STANDARDS OF SIGNIFICANCE
ARE INADEQUATE TO PROTECT THE PUBLIC

EIR page 4-220. SIGNIFICANCE CRITERIA: The Standards of Significance described in this section of the Fourmile Hill EIR appear to follow from CEQA Guidelines section 15064(I):

> *"If an air emission or water discharge meets the existing standard for a particular pollutant, the Lead Agency, the Lead Agency may presume that the emission or discharge of the pollutant will not be a significant effect on the environment. If other information is presented suggesting that the emission or discharge may cause a significant effect, the Lead Agency shall evaluate the effect and decide whether it may be significant. "* V.29

The Air Quality section of the EIR appears to consider only the first sentence of section 15064(I). The Lead Agency ignores a significant body of research regarding the effects of PM2.5, ignores the EPA s recent regulatory changes (and the human health benefits of the proposed changes), and thus fails to evaluate the effect and decide whether it may be significant. V.30

The Environmental Protection Agency (EPA) recently in July, 1997 set new standards for PM2.5 pollution. These regulatory changes were proposed long before the EIR was prepared and were predicted for implementation at this time, yet the EIR ignores them. These new standards were based on an EPA review of 86 PM-related human-health studies, covering millions of people, that show harmful effects of breathing PM2.5 pollution. PM2.5 pollution is qualitatively and quantitatively different than PM10 pollution, and may be more harmful due to deep infiltration into the lungs. In spite of these new standards, there is no mention of these $PM_{2.5}$ standards in the EIR. The EIR doesn't require monitoring of $PM_{2.5}$ pollutants as the EPA now requires. The EIR must re-address standards of significance and project impacts in light of these regulatory changes and this information.

Siskiyou County is currently rated nonattainment for particulate matter PM_{10} pollution. In part this is due to the smoke pollution from wood stoves and forest fires in this highly forested county. Yet the EIR falsely minimizes the range of pollutants by barely even mentioning smoke pollution as a source and not reporting how severe conditions can be at times of forest fires. This project will only add to those pollutants when they occur. The cumulative impact of both forest fire and power plant pollutants occurring at the same time is not evaluated, nor is a mitigation provided to shut down the power plant during adverse conditions of forest fire smoke pollution so that air quality doesn't deteriorate even further. V.31

(Similarly, the EIR's determination of significance for noise impacts was its erroneous attempt to use the standards in the Siskiyou County General Plan Noise Element. The EIR never discussed the other issue of significance when this plant's noise, and that of future power plants nearby, noticeably or significantly exceed the current quiet ambient sound levels. These errors point to an abuse of discretion by the Lead Agency in failing to adequately assess the real world noise impacts, as opposed to limiting the identification of significance based merely upon some simple-minded misquote of local noise standards.) V.32

THE NAT'L AMBIENT AIR QUALITY STANDARDS (NAAQS)
FOR PARTICULATE MATTER (PM) AND
FOR PM2.5 PARTICLES ARE NOT BEING UPHELD

The air quality standards have been changed recently for small particles but this Fourmile Hill project EIR is silent on the EPA's new $PM_{2.5}$ concerns and regulations. The EPA was under a court order to review the adequacy of the NAAQS for PM and to promulgate any changes needed to protect the public health and welfare. The process for this review involved the preparation of a multivolume "Criteria Document" that presents all the relevant scientific evidence concerning the health and welfare effects of PM. Welfare effects may include visibility impairment, soiling of materials, impacts on plants and ecosystems, etc. The EPA' s regulatory staff then V.33

prepared a "Staff Paper" which drew regulatory conclusions and recommendations from the Criteria Document on issues such as the appropriate size indicator, chemical composition and numerical range from which the EPA Administrator would select a final standard.

The EPA has prepared drafts of the Criteria Document and Staff Paper which have been released for public review and comment. The EPA is then required by the Clean Air Act (CAA) to have these documents reviewed for scientific accuracy and validity by a panel of independent scientists, mostly from academia, but with representatives from industry, states and government. This panel is called the Clean Air Scientific Advisory Committee (CASAC).

The court-ordered schedule for the PM NAAQS review included a date of Jan. 5, 1996 for CASAC to reach closure on the Criteria Document and Staff Paper. The CASAC has indicated that they need a *"meaningful extension of this date."* As a result, the EPA negotiated with the American Lung Association, which brought the suit resulting in the court schedule, a five month extension (until June 28, 1997) of the overall schedule for the PM NAAQS review.

The EPA Staff Paper recommended that an annual average standard for particles less than 2.5 mm in diameter (PM 2.5) be set between 15-30 $\mu g/m^3$. This compares to the current annual standard for PM10 of 50 $\mu g/m^3$. The Staff Paper also recommended replacing the current 24 hr PM10 standard of 150 $\mu g/m^3$ with a PM 2.5 standard of between 25-85 $\mu g / m^3$. While the EIR's predicted project emissions are lower than these limits, the EIR fails to also evaluate the cumulative impacts of other foreseeable geothermal power plants in this area.

It is difficult to compare the current and proposed standards because of the simultaneous change in both the size indicator and numerical level of the standards. In addition, the EPA is considering a statistical form for the new standard, e.g., allowing five expected exceedances of the 24 hr standard in a calendar year, that would significantly affect the relative stringency of the new standard. Nonetheless, it is likely that any new standard will require additional controls. It is also likely that PM controls under a new standard will be focused on stack emission sources (as opposed to fugitive emissions which tend to be larger particles) and also on emissions of sulfur and nitrogen oxides which result in formation of sulfates and nitrates in the atmosphere.

The change to a PM 2.5 standard will require major changes to the national network of PM ambient monitors. Once a new PM NAAQS is set, states will need to modify or replace their PM monitors and then take a year or two to obtain air quality data to determine what areas will require additional controls. V.34

Thus, the PM NAAQS revision will be potentially very costly in the end. Notably, this EIR fails to impose a mitigation on this project to help pay for the cost of such $PM_{2.5}$ monitoring. Thus, the Siskiyou County APCD's budget will have to bear that cost, further limiting its ability to monitor other air quality impacts of this project.

THIS POWER PLANT WILL EMIT HAZARDOUS QUANTITIES OF FINE PARTICLES INTO THE AIR

This project, not including the other foreseeable geothermal power plants in the vicinity, is predicted to emit between about 6.8 to 15.4 tons per year of PM_{10} particles. The quantity of the even smaller $PM_{2.5}$ particles which would be emitted is so great that, even with atmospheric dispersion, it is capable of completely covering 32 square miles per year of surface area! (see calculation below) That is an area of a square approximately 5.6 miles on each side which could theoretically be covered completely by such pollutants! There would be three times this amount of PM_{10} pollutants which are still hazardous. These particles are a significant health hazard and this hasn't be adequately addressed in the EIR.

Scientists who study particles make a distinction between coarse (large) particles and fine (small) particles. Fine particles behave entirely differently from coarse particles and, as we will see, are much more dangerous to humans. Fine particles are also much more difficult and expensive to control. They are also invisible, so when they are not controlled, there is no way to know it except by monitoring with the proper instruments.

Coarse particles are those with a diameter larger than 2.5 micrometers (micrometers); fine particles are those with a diameter less than 2.5 micrometers. A micrometer (micrometers) is a millionth of a meter and a meter is about a yard. (An older term for micrometer is micron.)

This project will emit large numbers of such particles, despite the best available control technology. One third of all the PM_{10} particles emitted will have a diameter less or equal to 2.5 micrometers.

It is difficult to imagine how small these particles are. To help understand what we're talking about, look at the dot over the letter "i" in this article's title: that dot measures about 400 micrometers in diameter. You can fit 40,000 particles with a diameter of 2 micrometers on the dot.

Each pound of fine particles emitted from will consist of about 1 quadrillion individual particles. A quadrillion is 1000 trillion. Over a year's time, this plant if operated full time and meeting the federal, state and local air quality standards, will legally emit up to about 2.3 to 5 tons of these fine particles/year. (based upon an estimate of 1/3 of the EIR's acknowledge emission of PM_{10} particles being $PM_{2.5}$ fine particles).

V.35

5 tons per year of such hazardous fine particles is a huge amount of such air pollution to be worried about. This doesn't include those larger particles which are still considered in the PM-10 measurement.

Breaking things into fine particles has the effect of vastly increasing their surface area. A single lump of waste weighing a pound (and having the same density as water) would have a surface area of about 44 square inches (a square 6.5" on a side), about the size of a large post card. But when that same pound is broken into fine particles, its combined surface area grows to 9900 square yards (approximately two football fields). This is important for several reasons: as these fine particles are emitted, they are immersed in a bath of gaseous chemicals that are cooling and are "looking" for a place to turn from a gaseous to a solid state. Fine particles, with their large surface area, provide an inviting place and so the surfaces of fine particles become covered with pollutants ("enriched" is the technical term for this) before they are released into the local air. Fine particles become coated with whatever else is in the smoke stack.

Here's where these small particle emissions become very significant: this plant when emitting 5 tons/year of fine particles among other things, is emitting a quantity of hazardous dust capable of completely covering about **32 square miles per year!** *(10,000 lbs. x 9,900 square yards per pound x 9 square feet per square yard / 43,560 sq. ft. per acre / 640 acres per square mile = about 32 square miles).* When such small particles are covered with condensed carcinogens and other hazardous substances, this volume and huge area of dust becomes a significant health hazard.

As the human body evolved throughout its long history, it adapted to the environment. One factor in the environment has always been dust, principally from dust storms. Dust from storms is larger than 5 micrometers in diameter and the human body evolved mechanisms for protection against such large particles. The hairs inside the nose, the mucous membranes lining the nose, throat and lungs, and even the shape of the throat, help to trap dust. As air is inhaled, the shape of the throat causes the air to swirl, so heavy dust particles are thrown outward by centrifugal force, where they strike the mucous-lined walls. As the tubes and passageways leading to the lungs twist and branch, they provide many opportunities for particles to collide with sticky walls and become trapped before they enter the lungs. Once trapped by mucous, coarse particles are coughed up and excreted.

V.36

Nature has gone to great lengths to protect the lungs because the deepest regions of our lungs provide places (called alveolar sacs, or alveoli) where oxygen passes into the blood and carbon dioxide passes out of the blood. The lungs provide a large surface area for contact with air, and thus with fine particles; the surface area of the alveoli is 65 square yards, which is larger than two tennis courts.

Thus, the deep regions of the lung provide very efficient, direct access to the blood stream and, by this means, to every part of the body. Unfortunately, humans now produce huge numbers of fine particles, and these are not caught by the body's protective mechanisms--they are simply too small. Fine particles pass easily into the deepest regions of the lungs, the alveoli, or alveolar sacs. There they remain indefinitely because no clearance mechanisms effectively remove them. Nature did not protect us against such particles, because none existed until very recently. Once lodged in the deep regions of the lung, fine particles, with their enormous surface area enriched with toxics, provide a particularly efficient means for delivering metals and organic pollutants directly into the blood stream. Their large surface area provides effective contact with moist tissue and the opportunity for dissolving or for other chemical reactions, putting pollutants directly into the victim's blood. Once in the circulatory system, toxics are then distributed throughout the body.

Fine particles have one other characteristic worthy of mention. They remain airborne for long periods of time and travel long distances--hundreds of miles, or ever farther. This occurs because they are so small and light that gravity does not pull them downward efficiently, so the slightest air current holds them aloft.

Furthermore, as we shall see, they are not removed from the atmosphere efficiently by rain. Therefore, for a long time after they are released into the environment, they remain available for humans to breathe in.

The National Academy of Sciences, in AIRBORNE PARTICLES (Baltimore: University Park Press, 1979), discussed the health dangers of fine particles from many points of view. The "background level" of these fine particles in uninhabited regions of Canada is 1 to 3 micrograms in each cubic meter of air; in the rural Midwest, you'll find 5 to 12 micrograms in each cubic meter of air. This is not a "natural" background level; it represents pollution created by humans. Nevertheless, this background level is a good standard against which to judge the allowable emission of particles.

The EPA is relying upon dilution to protect us. They will argue that, by the time those particles reach your lungs, they will be diluted in a lot of fresh air and thus won't be quite so far above background levels when you breathe them. But this, of course, depends upon how close you live to a geothermal plant, how the wind currents go, whether there are thermal inversion conditions in your local atmosphere, and so forth. There is growing evidence that the EPA's dilution strategy isn't safe.

"*In summary,*" said the National Academy, "*particulate atmospheric pollutants may be involved in chronic lung disease pathogenesis as causal factors in chronic bronchitis, as predisposing factors to acute bacterial and viral bronchitis, especially in children and cigarette smokers, and as aggravating factors for acute bronchial asthma and the terminal stages of oxygen deficiency (hypoxia) associated with chronic bronchitis and/or emphysema and its characteristic form of heart failure (cor pulmonale).*"

Now, just two years later, an extensive medical study has shown that human illness can result from particles in the air at levels that fall within EPA guidelines. In other words, an area may meet the federal requirements and yet still make residents sick.

The Harvard researchers say their results are important for another reason: there is some evidence that chest ailments during childhood predispose a person to permanent, serious breathing problems, like emphysema, in later life.

The study revealed that the 571 students (10.5% of the total) with asthma or persistent wheeze were particularly susceptible to bronchitis. Bronchitis was reported among 25.5% of the children with asthma or wheeze versus 4.0% of those without; for chronic cough the rates were 29.5% versus 3.2% and for chest illness 36.5% versus 7.6%.

An important point of this study is that it confirms that the relationship between particles in the air and childhood disease is "linear," which means that the more particles in the air, the more disease there is. This means that ANY increase in particles in the air is likely to cause disease in someone, somewhere. The defense, "I'm meeting all applicable state and federal standards" isn't sufficient to prevent illness. Even when a polluter meets those standards, someone will most likely get sick.

The absence of a threshold means that ANY exposure to fine particles will take its toll on the health of the exposed population. The fine particles produced by this plant are harmful to humans, especially to children. The cumulative evidence is now overwhelming and has been ignored for too long by the polluters such as this proposed Fourmile Hill geothermal power plant. It's time they were forced to confront the consequences of their dangerous technology.

IMPROPER DELAY IN PROVIDING COPY OF EIR
AND RELATED DOCUMENTS FOR PUBLIC REVIEW;
THEREFORE, ADDITIONAL REVIEW TIME REQUESTED

Finally, we request that additional time be made available for public comment on this EIR. In association with the citizens group, Mt. Shasta Tomorrow, we attempted to obtain a copy of this EIR and all related agency correspondence with the Siskiyou County Air Pollution Control District. Mt. Shasta Tomorrow mailed a Freedom of Information Act request letter dated September 3, 1997, but didn't receive any response until after the 10 working day deadline imposed by federal law. The EIR and APCD letters didn't arrive for our group's and Mt. Shasta Tomorrow's review until September 26th, barely in time to even begin to review before the September 30th comment deadline. The Lead Agency's delay in making such information available has severely prejudiced our ability to review and comment on this document. V.37

If you have any questions about any of the issues raised in this comment letter, please contact us at our address above. Please be sure to add our group's name to your mailing list so that we may receive any additional public notices, revisions to the draft EIR, and a copy of your agency's Response to Comments. V.38

Most importantly, until this EIR is corrected to reflect those valid public and other agency comments which are received, and the EIR is made to fully comply with NEPA and CEQA requirements, it is essential that your agencies not approve this Fourmile Hill Geothermal Plant project. V.39

Regards,

Carol Plank

Member, Medicine Lake Citizens for Quality Environment

cc: Save Mount Shasta
Mt. Shasta Tomorrow

attachment: Exhibit "B" - APCD's letter dated February 3, 1997 to Calpine

COUNTY OF SISKIYOU
AIR POLLUTION CONTROL DISTRICT
525 SOUTH FOOTHILL DRIVE
YREKA, CALIFORNIA 96097-3090
PHONE: (916) 841-4029
FAX: (916) 842-6690
JAMES R. MASSEY, JR.
AIR POLLUTION CONTROL OFFICER
PATRICK J. GRIFFIN
AIR POLLUTION SPECIALIST

February 5, 1997

Mr. Ed Merrihew
Calpine
1160 N. Dutton, Suite 200
Santa Rosa, CA 95401

Dear Ed.

I have reviewed the draft version of the Air Quality Impact Section of the Fourmile Hill EIR/EIS and would like to offer the following comments.

The Air Quality Section provides a good analysis of potential emission releases and their resulting impact. The study also quantifies expected emissions during normal plant operation. However, it appears that emission rates during flow testing and upset conditions are unabated. I understand the importance of assessing maximum emission levels and their resulting impact on the environment, however, it may also be important to inform the reviewer that control methods will be required for hydrogen sulfide and particulate matter during flow testing and upset conditions. It may be beneficial to expand the mitigation segment and include levels of control to be imposed within the permit to operate. Conditions to be considered for approval will include but will not be limited to the following:

1. H2S emissions from any single well drilling, testing, reworking or venting operation shall not exceed 10.0 lbs/hr.

2. H2S emissions shall be controlled by injection of hydrogen peroxide and/or sodium hydroxide into the blooie line, or other methods approved by the APCD.

3. H2S emissions during flow testing shall be monitored and results shall be reported to the APCD on a 24 hour basis, or as agreed upon by the APCD.

4. H2S emissions from the power plant shall not exceed 50 grams /MwHr.

5. The plant shall install a turbine bypass to reduce emissions during startup, shut down and upset conditions. The bypass will direct the steam around the turbine, through the main condenser, and on to the primary H2S abatement system prior to venting.

EXHIBIT "B"

6. At no time shall emissions of any pollutant for which there is a Federal or State ambient air quality standard exceed 250 lbs per day during construction or operation of the power plant.

7. An ambient air monitoring site shall be located at a site acceptable to the APCD which will help quantify levels of pollutants near sensitive receptors.

There will be other requirements designed to insure compliance with local, state, and federal air pollution regulations, but the above conditions will directly affect levels of H2S and PM10 from the power plant.

Sincerely,

Patrick J. Griffin
Air Pollution Specialist

cc: Randy Sharp, Ann Bertken

COUNTY OF SISKIYOU
AIR POLLUTION CONTROL DISTRICT

525 SOUTH FOOTHILL DRIVE
YREKA, CALIFORNIA 96097-3090
PHONE: (916) 841-4029
FAX: (916) 842-6690

JAMES R. MASSEY, JR.
AIR POLLUTION CONTROL OFFICER
PATRICK J. GRIFFIN
AIR POLLUTION SPECIALIST

September 16, 1996

Mr. Randall Sharp
USFS/BLM
800 West 12th Street
Alturas, CA 960101

Dear Randy,

I have reviewed the scoping report regarding the Fourmile Hill Geothermal Development Project EIS/EIR. The scoping report adequately addresses issues as raised by the public and provides needed input to help determine actions, alternatives, mitigation measures, and significant effects that need further analysis in the document. The Siskiyou County Air Pollution Control District (District) has no further comment on the scoping report but would like to briefly discuss how air quality issues will be addressed.

In performing a New Source Review the District must include consideration of air quality impact, existing air quality, a Best Available Control Technology (BACT) determination and assurance that the project will comply with applicable local, state and federal rules and regulations and not cause a violation of any ambient air quality standard.

Technical & Business Systems (T&B Systems) is conducting meteorological monitoring, and is working together with the District to establish baseline PM10 and H2S levels at the power plant site and the Medicine Lake recreation area. A PM10 monitor is also operating at the Lava Beds National Monument Headquarters. T&B Systems will utilize dispersion modeling to assess potential emission impacts of H2S and PM10 at sensitive receptor sites and class one land boundaries. Modeling will be conducted at the maximum allowable emissions rate and also at rates expected during possible emergency upset conditions.

A screening level health risk assessment will be used to evaluate exposure to toxic emissions as required by AB2588.

The air quality assessment will utilize U.S. Environmental Protection Agency and California Air Resources Board accepted methods and tools.

Sincerely,

Patrick J. Griffin
Air Pollution Control Specialist

/P.G.

Letter W

Medicine Lake Citizen's for Quality Environment
P.O. Box 34
Mt. Shasta, California 96067
(916) 926-5514

Concerned Friends of Medicine Lake:

Our group is writing to express our deep concern and our opposition to the proposed geothermal development in the Medicine Lake Highlands. W.1 They are not talking about two power plants-in reality it will be six and possibly more. W.2

Medicine Lake is a natural unspoiled lake located in a collapsed volcanic caldera, at the 6,700' elevation. What will become of pristine Medicine Lake and the surrounding environment if these huge geothermal projects are built? This is a recreation area loved by campers, hikers, fishermen, boaters, snowmobilers, hunters, and property owners. W.3

Medicine Lake has a historic Native American heritage dating back thousands of years. The numerous adverse environmental impacts of this geothermal development will not be easily or quickly remedied. The cost effectiveness of these projects is questionable. The environmental and ecological costs are not. These developments will be very costly to the Medicine Lake Highlands, and to the people and wildlife living in and using the area. W.4

The location of these projects are on "our land". The Forest Service and the Bureau of Land Management are paid by "us" to protect our lands. Will the USFS and the BLM allow our property to be desecrated for the "almighty dollar? W.5

We feel that if Medicine Lake Highlands could speak, she would beg you to protect her environment and wildlife. We ask your help in protecting the beauty of this pristine and unique area. W.6

To all of you who wrote letters and signed petitions we thank you, you make this job worthwhile. Please complete the enclosed Comment Sheet and return to the address on the bottom of sheet by Sept. 16th. This is very important! Thank you for your help and keep up the good work.

Sincerely,

Carole Plank
Medicine Lake Citizens for Quality Environment

Letter X

From Mount Shasta Area Audubon Society Board of Directors
Post Office Box 530
Mount Shasta, California 96067

To Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Geothermal Projects
USFS—800 West 12th Street
Alturas, California 96101

Re Fourmile Hill Geothermal Development Project

11 September, 1997

Mr. Sharp,

While the Mount Shasta Area Audubon Society (MSAAS) recognizes the importance of electrical power generation, that in many cases geothermal power plants are a more environmentally "clean" method of producing electricity than, say burning coal or gas, and that many hundreds of man-hours have gone into the development of the said project's draft EIS/EIR of July 1997, we oppose the said project as presented in the same because of several issues we see as unacceptable, potentially causing unrecoverable losses to the Medicine Lake Highlands and to the surrounding area that encompasses the proposed project site: X.1

- **Transmission Line** – The transmission line in segments A1, A2, B1, and C1 will cause unavoidable damage to the flora and fauna in its path, as well as causing a detrimental break in the now relatively unbroken forest there. The once completely forested area through which the line is proposed to course has already been completely disrupted by previous extractive ventures there, and much of the wildlife which happened to survive until now hangs by a tentative thread. Further disruption by this project can do naught but harm. X.2

In this light, there are several issues of particular concern to the MMAS.

1. The removal of 21.7 acres of late seral Red fir. X.3
2. The removal of 26.6 acres of natural Ponderosa pine forest. X.4

3. The disruption of habitat for the special-status species ash beardtongue, Liddon's sedge, gray penstemon, and volcanic daisy. X.5
4. Disruption of a relatively pristine wetland meadow. X.6
5. The close passage of the line to three Bald eagle winter roosting sites as well as Osprey habitat and nest sites. X.7
6. The passage of the lines through Northern spotted and California spotted owl habitat, roosting and nest sites. X.8
7. The passage of the line through the habitat, roosting and reproductive sites of seven bat species, four of which are listed as Fedral Species of Concern. X.9

The MSAAS is also concerned with the issue of roads as mentioned in the EIS/EIR. A plethora of roadways already exist on or near the proposed site. To build more would be redundant. In addition, it is a well studied fact that logging roads cause tremendous environmental damage by increasing sedimentation and erosion, increasing the risk of landslides, degrading water quality, and fragmenting wildlife habitat. X.10 X.11

Until all of these potentially damaging effects are removed from the realm of possibility, the MMAS Board of Directors will take whatever action necessary to see that the Fourmile Hill Geothermal Project EIS/EIR is rejected. X.12

Michael Heuptman

Mount Shasta Area Audubon Society Board of Directors

Letter Y

Mount Shasta Bioregional Ecology Center

P. O. Box 1143 • Mount Shasta • CA 96067 • Phone/Fax 916/926-3397

Via Facsimile and US Mail

September 30, 1997

Mr. Randall Sharp, Project Leader
Fourmile Hill Geothermal Project
USFS/BLM
800 West 12th Street
Alturas, CA 96101

Re: Draft EIS/EIR on the Fourmile Hill Geothermal Project

Dear Mr. Sharp:

We are writing in response to your request for public comments on the Draft Environmental Impact Statement/Report (DEIS/EIR) on the proposed Fourmile Hill Geothermal Development proposed for the Medicine Lake Highlands.

Since 1988, our non-profit public interest organization has been dedicated to the preservation of environmental and cultural values in the Northern California area. We have put this commitment to work in the Save Mount Shasta Project, the H.O.M.E. (Honor Our Mountain Environment) Stewardship Project, the Toxics Action Committee and others, have worked in close cooperation with the Native Coalition for Cultural Restoration of Mount Shasta, as well as conducted numerous educational and cultural events in the area. Our constituency numbers over 4,000 thousand people and is committed to preserving the beauty of the natural and cultural environment of this bioregion. Y.1

These comments incorporate by reference the comments of other groups with which we are cooperating. These include the Pit River Tribe, Quartz Valley Indian Reservation, the Modoc/Klamath Tribes, the Shasta Nation, the Native Coalition for Cultural Restoration of Mount Shasta, Medicine Lake Citizens for Quality Environment, the California Wilderness Coalition, the Klamath Forest Alliance, Medicine Lake Homeowners Association, Fall River Wild Trout Foundation, and the Fall River Conservation District.

The high level of environmental quality and pristineness of the Medicine Lake Highlands area, its exceptionally pure waters, its great cultural significance to several Native American Tribes, and the intense controversy that proposed geothermal developments are generating, are factors prompting us to have deep concerns about this proposed project. Y.2

Conflicts with established uses of the area

The Medicine Lake Highlands is an area of superlative beauty and solitude. The area has previously been proposed as part of the Lava Beds National Monument, and contains three roadless areas. In addition, as the easternmost habitat of the northern spotted owl, it contains a late successional reserves under Option 9 of the Northwest Forest Plan, and harbors a number of other species that are endangered, threatened or of Y.3

concern; including the pine marten, goshawk, bald eagle, osprey, pileated woodpecker and peregrine falcon.

The proposed development would bring levels of visual, noise, water and air pollution incompatible with age-old and current uses of the area. We feel it is vital to uphold the intent of NEPA and CEQA for better decisions that do not destroy the natural world, and to make a statement that a project should not qualify as "green" when it has such devastating environmental impacts on a pristine natural and cultural area as this Fourmile Hill project and the other projects for which it would open the door. Y.4

The Medicine Lake Caldera has from time immemorial been sacred to several Native American Tribes surrounding it, and we support the position of the Pit River (particularly the Ajumawi and Atwamsini Bands), the Modoc, the Klamath and the Shasta Tribes in opposing the development on cultural grounds under the National Historic Preservation Act, American Indian Religious Freedom Act, and other statutes and guidance documents.

The Medicine Lake area's Native American cultural heritage dates back at least 10,000 years. The Pit River, Klamath/Modoc, and Shasta Tribes all have sacred ceremonial and cultural sites there. The area contains important obsidian quarries and landscape features that have played an ongoing important role in mythology, cultural patterns and social systems of these tribal cultures from prehistoric times to the present. Many of the geologic sites formed by volcanic action in the Medicine Lake Highlands are known to hold spiritual significance. For Native American culture, environmental impacts are also cultural impacts, and so the effects of this project would have double consequences.

Many residents of our area, as well as visitors, greatly value the presence of Native American culture. The concept of Sacred Geography contains thousands of years of history and culture that are part of all of our heritage. The Medicine Lake Highlands is viewed as part of the sacred pattern tying in with the sacred meaning of Mount Shasta. Native American culture is an ancient and living statement that the land, plants and animals have a life and spirit of their own and should not just be exploited for ill-conceived destructive money making schemes. Y.5

Native American culture enhances the spiritual dimension of nature. It reminds us of the gifts we have been given and of the fact that we share the earth with other beings. The Native people deserve better treatment than they have historically had to suffer, and recent executive orders on the protection of Indian Sacred Sites (which states that adverse impacts must be avoided) and on Environmental Justice require the government agencies to give a great deal of weight to the cultural significance of the area in their decisionmaking. The USFS/BLM personnel that are pushing this project appear to be going through motions to disclose the extent of damage that would be done to the Native cultures, but they have let it be known that this is an unfortunate "unavoidable significant impact" and that the Native American tribes are not in a position to affect the decision. The DEIS/EIR underestimates the extent of the damage that would be done. Impacts of the proposed development would not be limited to the project boundaries or to archaeological evidence. The overall character, setting, biological and climatic make-up,

integrity of location, feeling, and association all contribute to the cultural and scenic quality of the area and are incompatible with industrial development.

The DEIS/EIR relegates to insignificance the loss of wilderness, forests, pristineness and recreation at Medicine Lake (see DEIS/EIR at 3-157 table 3.11-1). Some 40,000 people are known to use the campgrounds annually. These will be significantly impacted due to excessive noise, loss of visual, air and water quality and destruction of forests, plants and wildlife habitat, if the project is approved. Y.6

The DEIS/EIR at 4-193 comes up with an interesting measure. We read that "Any recreational user that is bothered or annoyed by operational noise or odors, or the visibility of the facilities at this site, can move out of the vicinity or make a decision not to hike or hunt in proximity to this site..." This response is unacceptable. People come to Medicine Lake to get away from urban industry, noise and pollution. The people who own cabins will be trapped by the pollution, noise, visual and water quality losses along with the loss of their property values. Y.7

And certainly this measure cannot be said to apply to Native American uses of historic and sacred sites which are hallowed by long continuous usage.

Agency bias

We have reason to believe that there is considerable bias and favoritism on the part of the USFS/BLM in promoting this project, and we have grave concerns that the final decision made will not be an objective one, genuinely weighing the environmental and cultural impacts against the purpose and need of the proposed development. Y.8

The DEIS/EIR, by its very size, makes a strong statement that the relationship of purpose and need to environmental and cultural impacts is at a ratio of 1 to 800 pages! Y.9

The DEIS/EIR does not establish a credible rationale nor economic viability for the project, nor that it is a viable geothermal resource. Economically, the transmission line would not be viable for a single power plant. Y.10

The proposed development appears to be a "foot-in-the-door" project which would usher in at least two and possibly five other geothermal projects, with a cumulative effect of industrializing the Medicine Lake Highlands and creating urban levels of visual, noise, water and air pollution as well as acres and miles of industrial blight. Y.11

The project appears to be industry-driven rather than actually meeting a need for resources in the area. This is not in keeping with the National Forest Management Act and the intended uses of public lands which should benefit the public and not private interests at public expense. Y.12

The National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) review process for the Fourmile Hill project appears to be on a fast track, presumably to meet Calpine's agreements with the Bonneville Power Administration (BPA), and in order to obtain subsidies from the California Energy Commission and qualify for tax credits; but most importantly to escape a complete environmental review of the cumulative impacts including the Telephone Flat Project for which another NEPA and CEQA review is underway, and other potential projects in the Medicine Lake Y.13

Highlands. There would be "unavoidable significant effects" on Native American traditional cultural values and long-term visual effects, not to mention severe impacts on water and air quality, forests and wildlife.

The general attitude of the USFS/BLM personnel in charge of this project has been one of contempt for the inconvenience that the public is causing them in wanting more information and meetings about the project. Freedom of Information Act (FOIA) requests have been delayed time and again and often only partially (and begrudgingly) filled. This has particularly been the experience of the Medicine Lake Citizens for Quality Environment, whose information we have shared. Y.14

A number of people had trouble obtaining copies of the 800+ page DEIS/EIR in a timely manner. A number of individuals and groups have asked for a 45 day extension to the comment period deadline in order to evaluate requested information and provide detailed comments. A two week extension was granted until September 30, 1997, but some of the asked-for documents have still not been received, and the time allowed is not sufficient to obtain these document nor to adequately review them. Y.15

Furthermore, certain communities have had to petition for a public meeting, held only two weeks before the original comment deadline, even though it has long been known (since the 1984 EA at least) that these communities have an interest in the welfare of the Medicine Lake Highlands. Y.16 The Forest Service has actually taken measures to prevent sport groups and campers who use the area from receiving information about the proposed development. Y.17

Finally, public notification and participation, particularly for the earlier EAs during the leasing and exploratory drilling stages of the project, has been extremely misleading and inadequate. Since the Fourmile Hill DEIS/EIR is based on the leases and earlier EAs, we have a grave concern that the public was never told of the full extent of these earlier proposals. Y.18

Overall deficiencies in the DEIS/EIR

The DEIS/EIR is not clear on its relationship to the leases that were awarded in the 1980s to explore and test geothermal potential in the Glass Mountain KGRA. Apparently the Fourmile Hill Exploration EA of 1995 was tiered to the Supplemental EA on the Glass Mountain KGRA. Y.19

However, there is confusion because the leases appear to grant not only exploration but also a "right" to develop geothermal energy on the leased lands, yet no environmental review leading to a decision to develop commercially can be found. What little public notification there was on the leases stressed the exploratory nature of the leases which were presumably awarded to test whether there was a resource worth developing. The previous environmental assessments (EA) considered only exploration and testing, not commercial development. Y.20 The EAs and the DEIS/EIR lack any Economic Feasibility Study to evaluate the viability of commercial development and to determine whether the environmental costs are even remotely justified.

Yet the DEIS/EIR appears to treat the right to commercially develop the geothermal resources as a "done deal" with only the details to be worked out! This smacks of a predetermined decision for which no public involvement or adequate environmental review has ever been done!!

At least three stages were skipped in the NEPA and CEQA process: 1) the actually exploratory stage of evaluating what the resource is and whether it is commercially viable and economically feasible in light of current market conditions—it is there on paper but apparently was never completed; 2) the stage of deciding whether commercial geothermal development should be permitted in this particularly landscape, which is a question for the Modoc and Klamath Forest Land and Resource Management Plan (Forest Plan); and 3) public notification in a way that is timely to giving input into the decisionmaking process regarding commercial geothermal development. Y.21

We do not believe that these three processes can be lumped into one DEIS/EIR, because they are sequential and not simultaneous. The DEIS/EIR for proposed project presumes that the earlier processes have been done. An analogy would be to propose a subdivision before a change in zoning has been granted (please see further discussion under Forest Plan processes below).

Deficiencies in providing credible data

For all its voluminous pages, charts, maps and analyses, the DEIS/EIR contains serious deficiencies in providing actually tested scientific information. Y.22

The Native American cultural significance of the entire area and of individual cultural sites seem to be lacking in evaluations for eligibility to the National Register of Historic Places. While the archaeological records have been searched and Native American comments have been given a place in the DEIS/EIR, the contrast between what they are saying and the discussion of impacts elsewhere is conflicting. Actual on-the-ground archaeological surveys are only at a preliminary stage of identification rather than an actual evaluation of impacts and adverse effects. The spiritual and cultural significance of traditional cultural properties in the area merit evaluation in light of their importance to these Native cultures, and also in light of the value that other residents and visitors place on American Indian culture. Y.23

Wildlife and botanical on-the-ground surveys are inadequate. Y.24

The DEIS/EIR lacks independent hydrologic and air quality reports. It also lacks in information which should have been developed in the exploratory drilling stages permitted by the earlier EAs (see water and air quality below). Y.25

Water quality issues:

Calpine, the geothermal developer for this project, did its own hydrologic report for the DEIS/EIR! We believe that a project of this level of controversy and impact merits an independent hydrologic report. The DEIS/EIR contains extremely limited and mostly speculative knowledge about the area. It does not adequately address issues such Y.26

as: where surface water goes, potential contamination by deeper, hotter waters; potential contamination of Medicine Lake and other water sources, including Little Medicine Lake, Bullseye Lake, Blanche Lake, Paynes Springs, Crystal Springs, Schonchin Springs, as well as the entire Fall River watershed. Related fluctuations of quantity, chemical composition and temperature of these waters are not evaluated with any scientific method or data. The result has been that the effects to air, water, wildlife etc. have been minimized and passed off as insignificant in the DEIS/EIR, or inadequately mitigated.

As indicated in the December 4, 1996 and subsequent letters by the Fall River Resource Conservation District, the project has the potential to affect more distant water sources because of the porosity of the volcanic soils and the prevalence of lava tubes which supply the Fall River, Big Lake and Horr Lake. Impacts on these water sources have also not been adequately addressed in the DEIS/EIR. Y.27

Many of these water resources no doubt qualify as high quality waters under EPA standards because of their purity and the general pristineness of the area. As such, they would fall under stricter EPA regulations than those applied in the DEIS/EIR.

At the September 3, 1997 Board of Supervisor's tour, an industry representative stated that Calpine had not determined if a viable geothermal power source even exists within the proposed project area because they had not completed test drilling (see draft EIS/EIR at 2-38). To date we understanding that Calpine has only drilled a temperature gradient well, no on-site exploratory wells.

According to the 1984 Supplemental EA for the Glass Mountain Known Geothermal Resource Area (the whole Medicine Lake resource area) to which the present DEIS/EIR is tiered, "Deep exploratory wells will provide specific data to more accurately analyze and predict effects on subsurface hydrology, and thermal and nonthermal surface waters. The exploration phase of this project is therefore essential to answering the questions regarding impacts of development. Exploration will yield necessary information on temperatures, pressures and fluid characteristics at depths which are currently only speculation. Information on rock types, permeability and porosity will also be acquired by deep exploratory drilling, thus adding substance to current hypotheses and models." Even though two temperature gradient holes were drilled to 2000 and 3500 feet, the results are applied to depths of over 6,000 feet. Y.28

As a result of not fulfilling exploratory drilling, there is no accurate chemical analysis on the geothermal fluids that would be produced. These could potentially be harmful to plant and animal life due to high concentrations of poisonous metals. The DEIS/EIR does not give a clear picture of what toxic materials would be brought to the surface, analysis of fluids. Y.29

The impact on fisheries was addressed in the 1984 Supplemental EA (p. 36) but seems to be omitted in the draft EIS/EIR. The 84 EA states "Any contamination of the water could eliminate or reduce the fishery in the lakes, thereby reducing their recreational value." The effects on endangered bald eagles, osprey or other animals eating contaminated fish are also not addressed. Y.30

Air quality issues:

Geothermal drift from the cooling towers could pollute a number of lakes and water sources. Y.31

The overall atmospheric effects of heat and moisture from cooling towers and pipelines (carrying 500-600 degree temperatures) could change the climate of the area and contribute to global warming, as well as have effects on snowmelt, animal habitat and migration routes. The DEIS/EIR does not adequately address these issues, for many of the reasons given under Water Quality above. Nor does it adequately analyze the impacts of acid rain and fog when emissions are combined with weather conditions and fall on trees, plants and lakes and affect the food sources of wildlife. Y.32

Data gained through monitoring of air quality and air inversion analyses during the exploratory stages must be part of the Final EIS/EIR, and data must be provided for long-term commercial operations. Y.33

Visual quality:

The DEIS/EIR minimizes the impacts of industrial discharges that would likely result in plumes over 500 feet high and visible for 50 miles or more, lit at night by all-night lighting. Figures given do not reflect that discharges would be produced 24 hours a day and would accumulate and spread out. Y.34

Evaluations and mitigation measures for the visual impacts of acres of buildings and asphalt, 24-hour lighting, miles of transmission lines and 36" above-ground pipelines are grossly inadequate given the present character of the area. Y.35

The analysis ignores the fact that the area presently has virtually no visual impacts, and that the night sky is totally dark except for the moon, planets and stars. The effects of visual impacts must be measured against a standard of pristine quality, not against urban standards. Places where a total night sky can still be experienced are becoming very rare in our world. Y.36

The Visual Quality Objective in the Forest Plan is "retain," and the effects are being greatly minimized to make it appear that this objective is being met. Visual Quality Objectives for potentially eligible areas to the National Register of Historic Places are not even being considered. Y.37

Noise

The impacts of noise would be heard over an area of more than four square miles, and the noise impacts from 24 hour plant operations, not to mention years of drilling and construction are greatly underestimated. The impacts of construction drilling would last at least 3 years, and over 20 years cumulatively if other power plants go in. These are downplayed, and their impacts on wildlife, cultural and scenic values are extremely underestimated in the DEIS/EIR. Y.38

The area presently enjoys virtually only natural sounds and great peace and tranquility. Again the effects must be measured against a very pure existing condition, not urban conditions.

The effects of noise on wildlife and on the areas that are supposed to be avoided under the Forest Plan presents a problem that is not being addressed in the DEIS/EIR (please see section on Forest Plans below). Noise knows no boundaries, and there would be no areas within 4 miles that would escape these effects. While the noise of construction may be relatively temporary, lasting several years, the effects on eagle nesting could be drastic, particularly in the vicinity of Fourmile Hill. Y.39

Forest Plan and NFMA processes:

Forest Plans are equivalent to zoning on public lands. They define what can and cannot be done and are presumably arrived at through a public process. The National Forest Management Act requires that undertakings be consistent with Forest Plans. Proposed developments must be compatible with other uses (see 1984 EA, page 4). Y.40

Forest Plans have to be revised or amended if the situation, conditions and assumptions that have been used in the development of the Plan have changed so as to require significant changes in management emphasis.

We believe that the Native American historic and cultural resources that have come to light as a result of the scoping for this project should lead to a re-evaluation of the management prescriptions for the Medicine Lake Highlands and the Timber Mountain-Dry Lake area, Management Areas 61, 62 and 63. Particularly in light of the Memorandum of Understanding between the U.S. Department of Agriculture, Forest Service and the Advisory Council on Historic Preservation dated February 25, 1977. At the very least, these areas should be evaluated for eligibility to the National Register of Historic Places and for adverse effects through the NHPA Section 106 Process and the Region 5 Forest Service Programmatic Agreement. Y.41

Furthermore, any amendment or revision to the Forest Plan that would affect traditional cultural resources and properties potentially eligible to the National Register are subject to the Memorandum of Understanding of February 25, 1977 between the U.S. Department of Agriculture, Forest Service and the Advisory Council on Historic Preservation.

In addition, a proposal for a transmission line corridor and the building of power plants, well fields, sumps, above-ground pipeline carrying temperatures of 500-600 degrees, etc. are impacts that exceed the current management prescriptions in both the Klamath and Modoc Forest Plans which stress recreational use and management for old growth species. Y.42

The Modoc Forest Plan states that:

> Leasees may not conduct activities in the following areas at any time:
> —bald eagle winter roosts and nesting habitat;
> —bald eagle feeding sites in high concentration areas;
> —goshawk nesting territories;
> —peregrine falcon nesting territories; Y.43

> —sage grouse strutting grounds;
> —old-growth forest (marten habitat);
> —streamside management zones. (Modoc Forest Plan at 1-2)

We do not believe that avoidance of these, and also the seasonal areas listed for osprey, golden eagles, winter deer and pronghorn range and kidding, deer fawning, Swainson's hawk, has been adequately demonstrated in the DEIS/EIR to meet the stipulations in the Forest Plan. There is a lack of on-the-ground observation regarding both wildlife and plant habitats, and most of the information given in the DEIS/EIR appears to be speculative and incomplete. The impacts of noise, as stated earlier, are inadequately addressed.

Similarly, "Protection of Highly Scenic and Sensitive Visual Areas" (Modoc Forest Plan at 1-2) is not conclusively demonstrated in the DEIS/EIR. We believe that visual impacts, particularly those associated with the steam plume, lighting, the transmission line, and above ground pipelines are being underestimated. The cumulative effects of the steam plume and lighting, combined with certain weather conditions, would create a marked change in the night time visual quality of the Medicine Lake Highlands and for at least 50 miles away. (Please see further discussion under visual quality above.) Y.44

In addition, we believe that the DEIS/EIR does not sufficiently meet the additional stipulations in the Modoc Forest Plan regarding geothermal development, particularly those having to do with areas potentially eligible to the National Register of Historic Places, Protection of Wetlands and Watersheds. Y.45

There is an absence of any NEPA process to amend the Modoc and Klamath National Forest Plans. When impacts are as significant as they are here, the Forest Plans should be amended or revised through a full public participation process before doing a DEIS/EIR on a project.

The present DEIS/EIR seems to propose amending the Forest Plans simultaneously with the analysis of impacts of the proposed project. However, there has been no specific public input on the Forest Plans changes. We believe that this violates the National Forest Management Act and its implementing regulations (36 CFR 219), the NEPA process, as well as Forest Service Manual 1909.15 on Environmental Policy and 1909.12 on National Forest Planning. A Forest Plan amendment needs to be prepared on each issue, with appropriate public involvement. At no public meeting in our area was amending or revising the Forest Plans brought up or input sought on these issues. The Modoc Forest Plan (and presumably the Klamath Forest Plan[1] contains a similar provision) states: Y.46

> If the Forest Plan requires amending, the Forest Supervisor determines whether a proposed amendment would result in a significant change to the Plan. If the change is significant, the Forest Supervisor shall follow the same procedure required to develop and approve a Forest Plan. The Regional Forester approves significant amendments. If the change is not significant for the purposes of the planning process, the Forest Supervisor may approve and implement an amendment after the public is notified and NEPA procedures are completed. (Modoc Forest Plan at 1-3)

[1]Note: a request to the Klamath National Forest for their management plan made 10 days ago has still not been received as of this writing.

There are also Northwest Forest Plan Option 9 requirements to do a watershed analysis before proposing major projects. To our knowledge this has not been done. All action alternatives in the DEIS/EIR have significant impacts on old growth forests and some of the wildlife species protected under the Northwest Forest Plan, as well as other species of concern. The DEIS/EIR fails to meet the requirement of an action alternative without significant impacts on old growth forests. Y.47

The criteria used for determining impacts on old growth does not apply to lodgepole pine forests because of the slow growth of trees under the harsh conditions present at the Medicine Lake Highlands. The DEIS/EIR uses the standard of measuring trees at chest height, but a seven inch diameter lodgepole pine can be 80+ years old. Presence of old growth species (pine marten, etc.) and the actual age of the trees should be the determining criterion. Y.48

Three roadless areas — Mount Hoffman Roadless Area, Glass Mountain and the area north of Dry Lake — were identified in the 1970's as potential wilderness, released as roadless areas. No impacts on wilderness or on non-motorized primitive recreation are analyzed in the DEIS/EIR. We understand that impacts of first entries into Roadless Areas require a NEPA process of their own. Y.49

Cumulative effects

CalPine's contract with the Bonneville Power Administration is for 135 megawatts (MW). The DEIS/EIR does not address the remaining contract above the 49.9 MW proposed through this project. Y.50

The project requests approval for a transmission line that can serve 300 MW transmission line which could potentially serve all the leasees in the Medicine Lake area. Yet no cumulative impacts are analyzed even though six leases have been sold, and the 1984 EA mentions that the area has a potential for ten power plants! Y.51

We believe that in order to adequately evaluate the impact of geothermal development within the Medicine Lake Highlands and surrounding areas, the lead agencies must consolidate and coordinate the environmental review process into one master plan for all potential project permits. The Fourmile Hill draft EIS/EIR piecemeals the cumulative environmental effects of this and other proposed projects. The Proposed Cal Energy Telephone Flat project is already in the EIS scoping stages and at least a third project has been discussed. Only through a comprehensive EIS/EIR can all the cumulative effects be properly evaluated. Part 1508.7 of the CEQ Regulations implementing NEPA expressly defines cumulative impacts as: Y.52

> ...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency ... or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Inadequate evaluation of potential for accidents, erosion

Well blow-outs and other accidents known to be associated with geothermal development are not adequately evaluated or covered by the $100,000 bond. We understand that there has been a blow-out in the exploratory stages when two people lost their lives which is being hushed up. Y.53

Lack of economic feasibility study

An economic feasibility study is necessary to evaluate whether the economic need for the project justifies the environmental costs. Project proponents have indicated that the cost of producing power from this project would be twice the current market rate, and the project proponent has no current buyer for the power, in spite of the DEIS/EIR's statement about the "need to economically produce and deliver electrical energy to BPA [Bonneville Power Administration] and others..." (DEIS/EIR at 1-3). Evidently BPA, in order to enhance its offering of "green energy" to customers, has offered to be a wheeler for power that has not yet been sold. Another factor is that the information necessary to evaluate the longevity of the geothermal resource has not been developed due to the lack of exploratory drilling. Y.54

The project appears not to be able to stand on its own but will rely on a $2 million annual subsidy from the California Energy Commission (CEC) pending the approval of the DEIS/EIR. If the CEC funds this as benign "green" energy, it would be a terrible misuse of taxpayer monies. We believe that CalPine may also be benefitting from tax credits for this project, but do not yet have sufficient information on this. Y.55

Seismic activity

The DEIS/EIR fails to provide information evaluating effects of the project on potential seismic activity. In a volcanic area this is a large omission. The DEIS/EIR 4-8 states that "Withdrawal or injection of large amounts of fluid from the geothermal reservoir could cause increased seismic activity in the project area..." At 4-9 we read that such impacts would be "adverse, but not significant." No data is given to back this up. We understand that USGS information has been developed on the area but was not used in the draft EIS/EIR. Y.5

Minimizing significance

Throughout the draft EIS/EIR minimizes the significance of impacts without substantiating their findings, thus avoiding more stringent analysis and mitigation measures. The impacts of large quantities of hazardous materials and wastes going to and from power plants during summer months when visitors come to the area or during winter months when dangerous road conditions prevail; the potential chance for accidents, leaks, accidents, seismic activity, and many other aspects of this proposed development are passed off as insignificant to avoid full analysis. Y.57

Lack of consideration of alternatives

The DEIS/EIR contains very little discussion of alternatives to meeting electric energy needs through other means, such as solar energy, wind generation, or, most importantly through developing an *energy conservation strategy.* Y.58

We believe that the public is being misled by the USFS/BLM in that the proposed development is being passed off as a "green energy" project with low impacts to the environment. This is *absolutely* not true for a forested culturally sensitive pristine area such as the Medicine Lake Highlands. Y.59

A feasibility study should also evaluate alternative power sources, and an energy conservation strategy, as viable economic alternatives to the proposed geothermal development, particularly given the environmental sensitivity of the Medicine Lake Highlands. Y.60

In conclusion, through this partial analysis, we hope that we have shown that the outstanding environmental quality of the Medicine Lake area, its Native American cultural importance, and environmental issues of high significance are not being adequately addressed. The DEIS/EIR is flawed in its inception, since it has not addressed the basic questions of whether commercial geothermal development should be permitted, is inconsistent with applicable Forest Plans, and has not provided for an adequate public notification and participation process in these decisions. Y.61

As a government agency which has been given responsibility for our public lands and their natural and cultural resources, we urge you to adopt the no action alternative and leave Medicine Lake Highlands in its beautiful pure inspiring condition. Y.62

Very truly yours,

Michelle Berditschevsky
Project Coordinator
President of the Board of Directors

cc: Pit River Tribe
Klamath/Modoc Tribes
Shasta Tribe
Medicine Lake Citizens for Quality Environment
Advisory Council on Historic Preservation
White House Council on Environmental Quality
Environmental Protection Agency
Senator Barbara Boxer
Senator Dianne Feinstein
Bonneville Power Administration
Regional Water Quality Control Board
Siskiyou County Board of Supervisors
Charles M. Miller, Esq.

Letter Z

MT. SHASTA SNO-MOBILERS INC.
P.O. Box 341
Mt. Shasta, CA 96067
Snow Phone: (916) 926-2824

August 18, 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp,

I am writing you this letter not as an advocate or an opponent, but as a neutral President of the Mt. Shasta Sno-Mobile Club. Unfortunately I have not been able to attend any of your local public hearings regarding the Fourmile Hill Geothermal Development Project, but several members of our club have attended meetings, one of them you might have heard of is Chuck Best from Weed, CA. I believe our club is split on their views of this project. I'd like to address some of the concerns of our members in this letter. Z.1

Some members do not want this project to happen. They have many concerns and do not want to give up any of their snowmobiling areas.

Some members think this project is good for our community and it will create much needed jobs and revenue. They support this project.

My concerns for my fellow snowmobilers are as follows:

1. The Door Knob Snowmobile Park will be left high and dry of snow. With the plowing of the road leading past the Park, we will be unable to groom this road, therefore we will not be able to ride our snowmobiles out of the Park. As I understand it, a staging area will be provided further past the Park, but no snowmobiling between the Park itself and the staging area will be possible. It is customary to have our warming huts as a parking lot which has groomed snowmobile trails leading away from the park. This allows snowmobilers to return to the park during their riding day to warm up, eat, or use rest rooms. Here are a few ways we could solve this problem. Z.2
   a. An area along the plowed road could be provided for a snowmobile groomed trail.

President:	Vice President:	Treasurer:	Secretary:
Eileen K. Maier	David Patrick	Wendy Shipman	Lynnette Jasmer
842-2609	842-4709	872-7190	235-4391

b. Another route from the Park to our riding area could be provided to allow grooming.
c. The Door Knob Snowmobile Park itself could be moved further up the road to the new staging area.

2. The steam pipelines which run above ground will be impassable by snowmobiles. We will not be able to get over or around these pipelines. Is it possible to have ramps over the pipelines on known snowmobiling trails? Z.3

3. There is also the issue of losing more riding area. I realize there will be no riding near the Power Plant and around the pads, but my concern is over time more and more areas will be closed to snowmobiling. Z.4

4. There are also snowmobilers whom come down from Oregon and use the Door Knob Snowmobile Park. Not all of these snowmobilers are members of our club and I can not speak for them, but it is our concern they will not have a warming hut to use either. Z.5

Thank you for your time and for keeping us in the development loop. If there is anything I can help you with or any questions I could answer, please don't hesitate to contact me at the below address.

Sincerely;

Eileen K. Maier

Eileen K. Maier
President, Mt. Shasta Sno-Mobilers Inc.
730 Greenhorn Road
Yreka, CA 96097

cc: Barbara Holder; Klamath National Forest, U.S. Forest Service
Diane Henderson-Bramlette; Modoc National Forest, U.S. Forest Service

Letter AA

MT. SHASTA TOMORROW
An Organization of Concerned Citizens
101 E. Alma Street, 100-A
Mt. Shasta, CA 96067
(916) 926-5115

Randall Sharp — Project Leader
Fourmile Hill Geothermal Power Plant Project
U.S. Forest Service
800 West 12th Street
Alturus, California 96101

PUBLIC COMMENT:
Draft EIR/EIS
FOURMILE HILL GEOTHERMAL PLANT

Dear Mr. Sharp: 9/29/97

In reviewing the Draft EIR/EIS for the Fourmile Hill project, it is apparent that it greatly underestimates the noise impacts of this power plant project on the now quiet vicinity around the Medicine Lake area.

The estimated sound levels from these power plant operations are provided in Table 4.14-4. For example, at the Schonchin Picnic Area, the Draft EIR/EIS estimates an overall noise level from the project of 18 dB(A) LEQ. This picnic area is about 2-1/4 miles from the Fourmile Hill power plant site. This sound level estimate is not consistent with other information in the Draft EIR/EIS, in that it understates the likely noise levels heard at these recreational and residential areas.

Elsewhere, the Draft EIR/EIS states that noise levels would be about 66 dB(A) at 850 feet from the power plant when it is operating. (page 4-261, 3rd paragraph) Using the Draft EIR/EIS's estimate that this sound level decreases 6 dB(A) for each doubling of distance provides these noise values at other distances: AA.1

850' =	(0.16 miles):	66 dB(A) LEQ
1700' =	(0.32 miles):	60 dB(A) LEQ
3400' =	(0.64 miles):	54 dB(A) LEQ
6800' =	(1.28 miles):	48 dB(A) LEQ
13600' =	(2.57 miles):	42 dB(A) LEQ
27200' =	(5.15 miles):	36 dB(A) LEQ

Therefore, the sound level at the Schonchin Picnic Area which is about 2-1/4 miles should be about 43 dB(A) LEQ by interpolation or mathematical calculation, not 18 dB(A) as claimed. The sound level at that location will be significantly louder than the Draft EIR/EIS estimates, or somewhere in the vicinity of five times louder as people would experience. That increase in sound level above what presently exists itself would create a significant environmental impact which this Draft EIR/EIS doesn't acknowledge. This is because the sound level now is in the range apparently of 20 to 30 dB(A). An increase of

perhaps over 20 dB(A) would be discernable by all but the deaf, and a great nuisance and source of annoyance and anger.

A sound level of 43 dB(A) LEQ when corrected for increased night noise sensitivity would be equal to a 'day-night average' of 50 dB(A) CNEL. That project-related sound level would also be inconsistent with the Noise Element of the Siskiyou County General Plan which has limits when adjusted for quiet rural areas of only 45 dB(A) CNEL. If this power plant produced impact sounds, as the Draft EIR/EIS reveals, the County's standards require another adjustment of +5 dB to limit such maximum noise impacts to only 40 dB(A) CNEL. Yet the data in the Draft EIR/EIS provides evidence as shown above that at this picnic area the noise level will be 50 dB(A) CNEL, considerably louder (twice as loud) as the General Plan allows. Inconsistency with the General Plan is considered by CEQA to be a significant environmental impact, yet the Draft EIR/EIS fails to acknowledge this fact.

Moreover, this environmental impact is not adequately mitigated to a less-than-significant level. Therefore, CEQA requires that the Alternatives Analysis discussion of an EIR consider project alternatives which would be able to lessen such significant impacts. This Draft EIR/EIS does not consider any alternative sites for the Fourmile Hill project's location which would be farther from these sensitive locations, or would be behind some prominent geological feature so as to block such noise, and therefore it violates CEQA. The only alternatives provided are for power line location, but those alternative locations won't affect the noise from the power plant itself.

The Draft EIR/EIS is also required to examine cumulative impacts of other proposed projects such as the Telephone Flat Geothermal Plant proposed nearby. When cumulative impacts might be significant, an EIR must reveal this, must attempt to mitigate them, and must look at project alternatives if they can't be mitigated to less-than-significant. This Draft EIR/EIS fails to do that. Instead, it declares that such cumulative impacts are insignificant without providing any calculations to support its conclusion. Accordingly, the Draft EIR/EIS violates CEQA requirements.

For example, from the homes at the south-east side of Medicine Lake, the Telephone Flat Geothermal Plant will be about 1.1 miles away. If it is as loud as the Fourmile Hill plant, it's noise level at those cabins' location using the above analysis of distance reduction will be about 49 dB(A) LEQ. Similarly, the Fourmile Hill project is about 3.5 miles from these cabins and will generate about 40 dB(A) LEQ. The cumulative total of just these two power plants will be about 50 dB(A) LEQ. Other power plants which are proposed in the Medicine Lake area would increase these levels even more. This cumulative sound level for both power plants operating at the same time of 50 dB(A) LEQ when corrected for increased night noise sensitivity would be equal to a 'day-night average' of 56 dB(A) CNEL. That combined noise level is in excess of the Siskiyou County General Plan maximum allowable limit of 55 dB(A) even without the 15 dB corrections for quiet rural areas and impact sounds. Therefore, the cumulative impacts of both are significant if left unmitigated and the Draft EIR/EIS is erroneous to claim otherwise. For this reason, the Draft EIR/EIS is legally inadequate and the project should not be approved. AA.2

Sincerely, Dale LaForest

Dale LaForest — Director, Mt. Shasta Tomorrow

Letter AB

NATIVE COALITION
FOR CULTURAL RESTORATION OF MOUNT SHASTA
Cultural Component of the California Council of Tribal Governments
P. O. Box 1143 • Mount Shasta, CA 96067 • Phone/Fax 916/926-3397

Via Facsimile

September 30, 1997

Randall Sharp, Project Leader
Fourmile Hill Geothermal Project
USFS — 800 West 12th Street
Alturas, CA 96101

Re: Comment on the Fourmile Hill geothermal project

Dear Mr. Sharp:

The Native Coalition for Cultural Restoration of Mount Shasta is submitting these comments in strong opposition to geothermal development in the Medicine Lake Highlands and in support of the Native American Tribes whose sacred lands are being threatened by geothermal developments. AB.1

The Native Coalition represents a broad constituency of Native American tribes and individual traditional people who are concerned about cultural values on Mount Shasta and surrounding areas. Participants in the Native Coalition include the Pit River Tribe, Shasta Nation, Resighini Rancheria, Local Indians for Education, the Intertribal Council of California,[1] the California Council of Tribal Governments,[2] and Save Mount Shasta.[3] Native Coalition meetings are attended by traditional people of the Shasta, Pit River, Wintu, Karuk, Modoc, Paiute, and Wiyott Tribes, as well as individuals from the Lakota, Cherokee, Hopi, and other tribes. AB.2

We support the Pit River, Modoc/Klamath and Shasta Tribes in their opposition to these developments which would have devastating impacts on the sacred character of the whole Medicine Lake Highlands; on many individual sites and cultural resources; on the water quality of Medicine Lake and the many springs, creeks and rivers that have their sources in the Highlands; on the animals, their habitats and migration routes; on the trees and plants; on the visual and air quality; and on the peace and natural beauty of the area.

[1] Intertribal Consortium members include the Benton Paiute Reservation, Big Pine Reservation, Big Sandy Reservation, Bishop Paiute Reservation, Blue Lake Rancheria, Bridgeport Indian Reservation, Chemehuevi Reservation, Colusa Rancheria, Cortina Rancheria, Dry Creek Rancheria, Elk Valley Rancheria, Fort Bidwell Reservation, Grindstone Rancheria, Laytonville Rancheria, Lytton Rancheria, Manchester-Point Arena Rancheria, Redwood Valley Rancheria, Resighini Rancheria, Santa Rosa Rancheria, Shingle Springs Rancheria, Smith River Rancheria, Table Bluff Rancheria, Timbisha Shoshone Reservation, Trinidad Rancheria, and Upper Lake Rancheria.

[2] A consortium of Federally Recognized Tribal Governments which includes the United Auburn Indian Community, Cortina Rancheria, Fort Bidwel Indian Community Council, Grindstone Rancheria, Hopland Reservation, Pit River Tribal Council, Potter Valley Rancheria, Quartz Valley Reservation, Resighini Rancheria, Robinson Rancheria, Rohnerville Rancheria, Sherwood Valley Rancheria, Susanville Rancheria, and Upper Lake Rancheria.

[3] A grassroots preservation organization working to preserve the environmental and cultural integrity of Mount Shasta since 1988.

Mr. Randall Sharp
September 30, 1997
Page 2

We are concerned that the 300 megawatt transmission line has the potential to serve six power plants like the one being proposed as the Fourmile Geothermal Development. The combined impacts are not being addressed in the current Environmental Impact Statement/EIR. The developers do not know the results of disturbing an active volcanic area. They have not sufficiently tested the potential hazards to water, air and life according to law. There is no demonstrated need for the project, and no economic feasibility study. AB.3 AB.4 AB.5 AB.6

We invoke the US Government's Trust Responsibility to the Indian Peoples of this land, the Executive Order on Indian Sacred Sites, the Executive Order on Environmental Justice, the American Indian Freedom of Religion Act, the National Historic Preservation Act, and National Register Bulletin 38 on Traditional Cultural Properties. The environmental document you have prepared states that impacts to Native American cultural values will be significant and adverse. Geothermal development is incompatible with existing long-standing spiritual and cultural uses of the area and its natural resources. The government itself according to its own laws must not permit this development. AB.7

The Medicine Lake Highlands are a traditional haven to Native American People and have been used as religious, ceremonial, and gathering grounds for thousands of years. They are highly significant to the cultural continuity of the Tribes in Northern California and Southern Oregon.

The "No Action" alternative is the only right decision regarding this development that would devastate Native American sacred lands. AB.8

For the purpose of legal standing, we ask you to incorporate by reference the comments and concerns of the signatories to the attached letter dated September 21, 1997. Incorporation by reference refers to comments made by individuals as well as organizations on the attached letter, as well as Philip Woodward, Louise Thompson, Suzanna and Peder Cuneo, other members of the Medicine Lake Citizens for Quality Environment, and the Fall River Resource Conservation District. AB.9

Very truly yours,

Michelle Berditschevsky
Coalition Secretary

cc: Coalition participants
Advisory Council on Historic Preservation
California State Historic Preservation Officer
Native American Heritage Commission
Office of American Indian Trust
Office of Environmental Justice
Environmental Protection Agency
Charles M. Miller, Esq.

NATIVE COALITION FOR CULTURAL RESTORATION OF MOUNT SHASTA
PO Box 1143 • Mount Shasta, CA 96067 • Phone/fax 916/926-3397

Letter AC

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, Ca 96101

I adamantly oppose any construction of a geothermal power plant in the Medicine Lake highlands region. AC.1

This area has been and still is SACRED to the Pit River, Klamath, Modoc and Shasta tribes for many centuries. AC.2

A presidential order declared this area an old-growth reserve as part of the Northwest Forest plan. Disturbance of this region will DISRUPT and DAMAGE those trees and the entire area. AC.3

I support alternative forms of energy as a good start to sustaining the earth's precious resources, at the same time I am AGAINST anything that violates and stops peoples' abilities to practice religious and spiritual practices. AC.4

Regardless of the advantages of this project- it is wrong to destroy Sacred Places!!

I urge you to....

PROTECT MEDICINE LAKE !
DO NOT DESTROY IT! AC.5

sincerely,

signature
name(printed): Tim McKay
Address: 879 9th St
Arcata CA 95521
Northcoast Environmental Center

Letter AD

VIA CERTIFIED MAIL

PO Box 617
Fall River Mills, CA 96028
September 28, 1997

Mr. Randall Sharp, Project Leader
Fourmile Hill Geothermal Project
USFS/BLM — 800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The following comments are written on behalf of the Pit River Tribe regarding the Fourmile Hill Geothermal Project in the Medicine Lake Highlands. The Pit River Tribe has already expressed many concerns about and opposition to this project, and this previous input is incorporated into these comments by reference. AD.1

We are alarmed that Tribal concerns are not being given more weight in the EIS/EIR document, and that the Tribe's concerns are played down in other sections of the document. Overall, selective scientific data is being used to minimize the significance of impacts. It may be hard for the Forest Service and project developers to understand the deep ties and concerns that the Native People have to their ancestral lands. This is not limited just to traditional cultural properties and cultural resources, but to all aspects of the natural environment of our ancestral lands. AD.2

The significance of the Medicine Lake Highlands is greater and goes much beyond what has been expressed in the Ethnographic Report. What goes unexpressed is its meaning as a place of refuge, not only for spiritual purposes, but also refuge in times of disaster and persecution, as in the 1850's when the Pit River People were rounded up by the government. Everything we need for our wellbeing exists in the Medicine Lake Highlands. All of our needs were supplied in the way of food through plants and animals, medicines, clean water, materials for tools and trade, as well as the awe-inspiring beauty which only testifies to the greatness of our Creator and our ability to express and communicate our enjoyment of all these gifts to the Creator. AD.3

All of this has been severely impacted everywhere through activities of the government and its agencies. The Medicine Lake Highlands still retains much of that original abundance, as evidenced by cultural features located within the Highlands.

The following comments are specific to this EIS/EIR. We have asked for an extension of the comment deadline until October 16th, but this has not yet been granted. The complexity of the issues, and the extent of the information in the EIS/EIR require more time to be understood and responded to. Therefore what follows is a partial comment. If the deadline extension is granted, more comments will be made. AD.4

We have identified the following issues of concern in the EIS/EIR for this project:

1. Incomplete Section 106 Process. The Section 106 Process of the NHPA appears to be only at the stage of initial identification. However, the conclusions drawn make it AD.5

appear as if the whole Section 106 Process has been done. The 36 CFR 800 regulations governing this process indicate that it should be done in the early planning stages, so that effects on cultural resources and properties that are eligible to the National Register of Historic Places can be evaluated "before specific projects are planned that may affect them" (see National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties, page 4). It is critical that the Section 106 Process, including eligibility determinations and adverse effects consultations, be done before any funds or licensing of the project is decided.

Because the Section 106 Process has not been completed, particularly the adverse effects and MOA consultations (see Appendix to this comment), statements regarding eligibility, adverse effects and mitigations have not been decided in consultation with the Tribes. It is clear that the intent of the Section 106 Process is that Tribal input is to be obtained regarding cultural resources. Therefore, statements in the EIS/EIR concerning eligibility, effects and mitigations are invalid because they are lacking the adverse effects and MOA consultations.

For example, the EIS/EIR at 4-333 under Unavoidable Significant Effects, states that "The project would not deny tribal members access to identified sites with religious significance, would not deny the right to conduct traditional or religious practices, or affect the physical integrity of identified sites." Such a statement was not arrived at in consultation with the Tribes. Also, at 4-334, we read that "The project noise and visible elements would *somewhat* alter the setting of the sites." This statement minimizes the impacts and does not represent how tribal people see the impacts. It points to the need for consultations concerning effects. It also negates what tribal people have said within this EIS/EIR, particularly at 3-67 and 3-68, namely that the project and the cumulative effects with other potential geothermal projects would "change the character of the entire Medicine Lake Highlands," and that "visual impacts to the area will be significant," to point to only a few. In other words, there is an extremely marked difference in the impacts as reported by tribal consultants and the reports written by MHA. The impacts are spelled out in the section on "Tribal Concerns" at 3-66 and following, but they are altered and trivialized in other sections. AD.6 AD.7

At 4-55, under Mitigation Measures, we read under section 4.51a, that Calpine "shall survey, identify and record cultural resources within the proposed transmission line corridor and where ground disturbance outside of the corridor would occur..." All this should be done *prior* to the final EIS or any Record of Decision on the project, not "prior to the commencement of surface disturbing activities." AD.8

At 4-55 and elsewhere, the EIS/EIR makes statements such as "At sites already determined eligible, prior evaluation and mitigation efforts (where conducted) shall be thoroughly reviewed to better assess the effects that this undertaking will have on the property, prior to construction activities." Information is lacking AD.9

about such sites. Which were determined eligible? By whom? What was the participation of the Tribes? Why was this information not made available to the Tribes? Again, any and all mitigation activities should be part of an MOA/PA developed in conjunction with and participation of the Tribes early in the planning process. See also EIS/EIR at 4-56, where again, a determination of eligibility is put off to the construction phase of the project "if avoidance is not feasible" and only then will a mitigation proposal be submitted to the Office of Historic Preservation.

The point with all mitigation measures is that they cannot be decided unilaterally but must be part of an MOA process with the Tribes before the Final EIS and ROD. See 36 CFR 800.11(c)(2)(iii). AD.10

Failure to follow the Section 106 Process in a timely manner puts the cart before the horse. The EIS/EIR at 4-54 states "Potentially undiscovered prehistoric and historic resources still exist buried within or immediately adjacent to the wellfield and power plant site, freshwater pipeline, and transmission line route. Excavation...could encounter unrecorded cultural resources. Destruction or unauthorized collection of a significant unrecorded cultural resource would be considered a significant impact. " This in direct contradiction to the paragraph directly above which states that "no unmitigated effect" would be allowed. The only way to assure this is to follow the Section 106 Process which requires that evaluations, effects and mitigations be decided early in the process and before a commitment of resources or issuance of any permit. AD.11

The way the USFS proposes to conduct the Section 106 Process in the EIS/EIR minimizes the spiritual, cultural and historic importance of the Medicine Lake area and fragments, piecemeals and runs counter to the intent of the NHPA Section 106 Process and Forest Service Manual 2360. In a historic area as significant as the Medicine Lake Highlands, greater levels of effort need to be made to identify historic properties early in the process and mitigate potential effects through an MOA/PA with affected Tribes, the State Historic Preservation Officer and the Advisory Council on Historic Preservation. AD.12

An important step in the Section 106 Process is evaluation of sites and cultural areas for eligibility to the National Register of Historic Places. To my knowledge, none of the areas have been submitted for eligibility to the National Register. I have seen no National Register documentation or registration forms submitted to the Pit River Tribe for review. AD.13

Two areas need to be evaluated as Historic Districts because of the numerous sites they contain, their interconnected features that have been demonstrated through Tribal field surveys, and significance of the areas as wholes. Because these districts are highly significant, they should be evaluated for National Register eligibility, as well as individual sites contained within the districts. AD.14

One Historic District includes the entire Medicine Lake Highlands, from and including Shotgun Peak on the south side to Paintpot Crater on the west, to Cougar Butte on the northeast side, to Mammoth Crater on the edge of Lava Beds National Monument, to the northwest slope of the Highlands below Fourmile Hill down to approximately the 5,500 foot elevation.

The other Historic District area includes Timber Mountain north to the Dry Lake area, where the proposed transmission line would occur, including the lava flow north of Dry Lake; then west from Dry Lake to East Sand Butte. The Dry Lake cultural district is an extensive archaeological site important during the Modoc Wars, also known as the Battle of Dry Lake of 1873.

Excerpts of the Section 106 Process are included in the Appendix to these comments.

2. Other applicable statutes, executive orders and guidance documents.
Under "Tribal Recommendations" at 3-69, the EIS/EIR states that "the Pit River Nation has issued a resolution against the project and stated that the project should not proceed without theapproval of the Pit River Nation." Parenthetically is added "(note: the Pit River Nation does not have legal authority over the proposed project)."

The Pit River Tribal Constitution Preamble has provisions for securing "rights and powers inherent in our sovereign status as reinforced by the laws of the United States, in developing and protecting Pit River ancestral lands and all other resources... [and]...preserving our land base, culture and identity. The Constitution states that "the territory of the tribe consists of all ancestral lands recognized by the Indian Claims Commission in its July 29, 1959 Findings of Fact and Opinions in Docket No. 347.... The jurisdiction of the tribe under this Constitution extends throughout its territory. Nothing in this article shall be construed to limit the ability of the Pit River Tribe to exercise its jurisdiction to the fullest extent permitted by Federal laws, including but not limited to land, water, property, air spaces, fish and wildlife and other resources."[1] AD.15

Also, this statement denies the Trust Responsibility of the US Government to the Indian Peoples of this land, Executive Order 13007 on Indian Sacred Sites and Executive Order 12898 on Environmental Justice. Both these executive orders mandate that affected tribal communities be appropriately involved and their views and cultural values be given weight. For consultations to be meaningful, Native People must be treated as more than just interested parties. Federally recognized Tribes should be given the same standing as other federal entities, such as the US Fish and Wildlife Service, Federal Energy Regulatory Commision, and other government agencies.

[1] In particular Article II, Sections 1 and 2 of the Pit River Tribal Constitution.

The Department of the Interior Implementation of Executive Order 13007 on Indian Sacred Sites (512 DM 3) outlines the following objectives:

- to accommodate the right of American Indians and Alaska Natives in the free exercise of religion by ensuring access to and ceremonial use of Indian Sacred Sites;
- to avoid adversely affecting the physical integrity of such Sacred Sites; and
- to consult with American Indian and Alaska Native Tribes on a government-to-government basis whenever the Department has reason to believe that its plans, activities, decisions, or proposed actions may compromise the physical integrity of, or access to Sacred Sites.

AD.16

The July 29, 1997 Draft Guidance for Considering Environmental Justice under the National Environmental Policy Act issues by the Council on Environmental Quality (CEQ Guidance) states:

> Environmental justice issues may arise at any step of the NEPA process and agencies should consider these issues at each and every step ofthe process, as appropriate. Environmental justice issues encompass a broad range of impacts covered by NEPA, including impacts on the natural or physical environment and interrelated social, cultural, and economic effects. (CEQ Guidance at 5 and 6)

AD.17

The American Indian Freedom of Religion Act, the National Historic Preservation Act, and National Register Bulletin 38 on Traditional Cultural Properties also give mandates and guidance for the involvement of Tribes in the process.

AD.18

The Forest Service needs to consult its own Forest Service Manual (FSM) 2360 on Cultural Resources and the Memorandum of Understanding between U.S. Department of Agriculture, Forest Service and the Advisory Council on Historic Preservation signed February 25, 1977. This MOU is found in FSM 2360, along with Coordinating Requirements for Undertakings. The Coordinating Requirements call for "Abandon undertaking" (FSM 2361.31) if adverse effects on cultural resources cannot be mitigated.

AD.19

3. The EIS/EIR is not in keeping with the Klamath and Modoc Land and Resource Management Plans (LRMPs). The LRMPs have not been taken through the amendment and revision process and do not permit an action of the scope and nature of the Fourmile Hill and other foreseeable geothermal developments in the Medicine Lake area. The Modoc LRMP states at 1-3:

> If the Forest Plan requires amending, the Forest Supervisor determines whether a proposed amendment would result in a significant change to the Plan. If the change is significant, the Forest Supervisor shall follow the same procedure required to develop and approve a Forest Plan. The Regional Forester approves significant amendments. If the change is not significant for the purposes of the planning process, the Forest Supervisor may approve and implement an amendment after the public is notified and NEPA procedures are completed.

AD.20

Under the National Forest Management Act (NFMA) and NEPA, amendments and revisions to the LRMPs necessitate a NEPA process of their own, with adequate scoping, public input and decisions that are subject to review. This has not been done and at no public meeting was input taken regarding amendments to the LRMPs. To assume that amendments and revisions of this extent can be done in the same document as a major project proposal is to suit the LRMPs to a specific project, rather than having projects follow agreed upon management prescriptions. This runs counter to the Forest Planning process in NFMA.

In addition, any amendment or revision that would affect traditional cultural resources and properties potentially eligible to the National Register must go through the Section 106 Process under the NHPA, according to the Memorandum of Understanding with the Advisory Council on Historic Preservation (see Appendix).

AD.21

4. Lack of exploratory data, effects on hydrology. The EIS/EIR lacks in evidence that the exploratory drilling stage permitted in the 1984 EA was completed. Data from exploratory wells are lacking and the viability of the project has not been demonstrated. As a result, the analysis of hydrology and impacts on water quality are speculative; effects the project on the quantity, levels, and chemical make-up of springs, creeks, lakes underground aquifers and watersheds affected by the project are lacking; impacts on air quality and the effects of emissions on plants and wildlife and pure waters are only guessed at; and there is an unanswered question about the extent and viability of the geothermal resource. The project proponent has not even determined that adequate geothermal fluids are available to "suggest the presence of a geothermal system capable of commercial development" (EIS/EIR at 3-37). We also read that "No geothermal fluid samples have been obtained from the geothermal system in the Fourmile Hill area, and thus no fluid analyses from the resource believed to underlie Calpine's leases are available."

AD.22

Other issues regarding hydrology are that there is no independent hydrological data. The only data in the EIS appears to be that supplied by the project developer, Calpine. In an area as important as water, the EIS/EIR should contain independent scientific information on the effects to the hydrology of the project area. Because of the lack of exploratory data, the impact of sulphur laden steam on the environment is underestimated and not supported by data. For cultural resources, the impacts on gathering sites for medicinal plants are of particular concern.

AD.23

AD.24

Water temperatures and water flow in affected springs, streams, lakes and aquifers need to be monitored <u>during the geothermal exploration phase</u> as it could be adversely affected by the geothermal pumping and re-injection. It could have a negative affect to the plant and aquatic life in Payne Springs and Payne Creek, among others.

AD.25

5. Cumulative effects of the proposed action with other foreseeable geothermal projects, including but not limited to the Telephone Flat project and a third development that

AD.26

is admittedly in the works, are not adequately analyzed in the EIS/EIR. Since the six leases awarded in the 1980s are not merely exploratory but are clearly preliminary to project development, the cumulative effects of all six leases should be analyzed in a master EIS/EIR. Given the extent of cultural reources in the Medicine Lake Highlands, and the Timber Mountain area, a cultural and historic management plan needs to be done, as indicated by Section 110 of the National Historic Preservation Act. AD.27

The 1984 EA states that the area has the potential for ten geothermal plants... Adequate analysis would indicate that the impacts, far from being "insignificant" (even for one plant they are not insignificant), would radically change the character, setting, biological and climatic make-up of the Medicine Lake Highlands and the Dry Lake area. The overall change would be from an area that is largely pristine and in its natural state, to an industrial area with miles and hundreds of acres of transmission lines, pipelines, plants parking lots, well pads, roads, etc. As a result of this grave omission, the discussions of the impacts of the proposed Fourmile Hill project on plants and wildlife, on water and air quality, on the Native American cultural character and setting, on visual quality, and on recreation, are inadequate and misleading. This amounts to avoidance of full disclosure of the significance of the effects and their impacts on the environment. AD.28

The EIS/EIR does not disclose, consider or evaluate the cumulative effects on visual quality, hydrology, wildlife, air quality, cultural resources, plants or any of the cumulatively affected environment. AD.29

6. Lack of public notification of the full extent of the project, particularly at the leasing stages. The leases were passed off as exploratory, but appear to include not only exploratory stages, but also lead to development stages. The project also involves other NEPA processes, and other aspects requiring Section 106 Process, such as amendments to the Modoc and Klamath Forest Plans, and entry into Roadless Areas. There has been no notification of these separate processes. AD.30

7. Transmission line. The Ethnographic Report for the Fourmile Hill Project, at the Summary of Chapter 5, page 25, states that "If the project is approved, the route that passes far north of Medicine Lake is viewed as the most feasible alternative." This is no longer true, due to the location and identification during field work in September 1997, which demonstrated the presence of several important traditional cultural properties with archaeological evidence, namely Indian Butte, Cougar Butte, Lookout Butte. Fourmile Hill will be surveyed after the current comment period and may demonstrate the presence of traditional cultural properties with archaeological evidence. Alternative 6 would have high adverse impact on the visual quality at Indian Butte, Cougar Butte, Lookout Butte, Fourmile Hill due to the close proximity of the transmission line to those sites. AD.31

Due to the lack of Section 106 evaluations of cultural sites, the Forest Service states: (EIS/EIR at 4-54) that "Additional surface disturbance (beyond the maximum of 335.8 acres along the transmission line route) could occur during the construction phase along the proposed transmission line route as a result of off-road vehicle traffic. The USFS would require that no unmitigated effect to AD.32

cultural resources occur as a result of this project." Such statements are premature and meaningless. This is a promise that cannot be fulfilled, because all the effects of construction cannot be mitigated. In addition, identification of cultural resources and their evaluation to the National Register must be made *before the decision is made to permit the project*. Under the NHPA Section 106 Process, mitigations are not to be decided unilaterally but are to be arrived at through a Memorandum of Agreement (MOA) or a Programmatic Agreement (PA) between the agency, the Advisory Council on Historic Preservation, the State Historic Preservation Officer, and affected parties.

8. Visual Quality

Areas in the west portion of the Medicine Lake Highlands would have a visible glow of indirect light, and in some instances visible direct light from the Fourmile Hill power plant and towers. Direct visible light would be seen from such areas as Redcap Mountain, Pumice Stone Mountain, Little Mount Hoffman and Medicine Mountain due to the elevation and line of sight of these peaks to the Fourmile Hill Project. AD.33

Fourmile Hill, Lookout Butte and Badger Peak would have the most significant visual effects during construction and operation periods both during daytime and nightime visibility periods.

During overcast periods, refracted light will be visible at some distance from the project and affect all the sites. This could have a significant visual impact to the traditional cultural properties, especially during use periods by Native People. This may cause the Tribal People to cease using these areas. Seeking other areas is not really an option, because the identified areas are those associated with traditional use and meaning over time. AD.34

During winter periods, night visibility will be an obvious effect from refracted light as far away as the Fall River Valley. An example of this type of refracted lighting is visible from Mount Shasta Ski Park at present, and is seen as an orange glow on overcast and cloudy nights. AD.35

At Table 4.6-1, page 4-73, there would be night time visibility at all sites, either from lighted steam plumes or refracted from clouds. The glow would be seen throughout Northern California and Southern Oregon. The lights would be seen more from the the north side of the Medicine Lake Highlands. However, the impacts would be significant throughout the area and beyond. AD.36

Sites 4, 5, and 16 are sites that may not have any significant visual impact from any and all of the Fourmile Hill project (except the night time visibility). All the other sites would have some steam plume visibility both day and night from cumulative effects from Fourmile Hill, Telephone Flat and other projects if developed. AD.37

Project development will be visible from a number of sacred sites, such as Indian Butte, Cougar Butte, Badger Mountain, Mount Hoffman, Red Shale Mountain, AD.38

some with a viewshed of transmission lines, and others having a viewshed to the well site, pipe lines and transmission lines.

The Pit River Tribe was never consulted during the steam venting simulation for the Fourmile Hill project, to determine their visual effects to traditional cultural properties important to the Tribe. Neither was the Tribe consulted about visual impacts resulting from the various transmission line alternatives. AD.39

Visual Quality Objectives were determined before any evaluation of the eligibility of cultural properties to the National Register of Historic Places. For eligible properties, criteria such as integrity of location, setting, feeling, and association have to *also* be considered, not only "preservation," "retention," "partial retention," "modification,"etc AD.40

All the six alternatives to the transmission line have visual impacts to traditional cultural properties as identified in the Ethnographic Report. AD.41

9. Archaeology
No consultations about archaeological sites have occurred between the Forest Service and the Tribes. As a result, statements such as "The historic site located in the vicinity of the wellfield and power plant area is...unlikely to be determined eligible for the NRHP" (National Register of Historic Places) (EIS/EIR at 4-53, with similar statements elsewhere) were not determined in consultation with the Tribes. At no time was the Pit River Tribe, or to our knowledge the Modoc Tribe, ever asked about the eligibility of this or other sites. Such determinations need to be made in consultation with the Tribes *before* project decisions are made. AD.42

The next sentence reads like an unproven speculation: "The historic site located in the vicinity of the wellfield and power plant area...is unlikely to be determined eligibile for the NRHP; thus impacts to this site are not expected."

The Modoc National Forest has refused to release archaeological site records concerning our own culture. The site records were not even released to the ethnographer contracted to do the Ethnographic Report by the Forest Service. As a result, the field survey with tribal consultants was not completed. Until the late 1980's, the Forest Service has always provided us with records or maps at our request. To remedy this situation, a process leading to an MOA for release of the records needs to be established with each Tribe. This needs to be done in a timely manner so that the effects of the proposed Fourmile Hill Project on archaeological sites can be evaluated in order to be included in the Final EIS/EIR. AD.43

The Pit River Tribe was never notified of the report prepared by Far Western Anthropological Research Group (FWARG) which identified previously recorded or known archaeological sites. The FWARG has never consulted or shared its AD.44

information with the Pit River Tribal Council. Apparently, the USFS did not even consult with its own Forest Archaeologist, Gerry Gates, in any Section 106 and eligibility processes. FWARG should have coordinated with the Forest Archaeologist who could have acted as an intermediary to assure involvement of the Tribes.

At 3-46 the EIS/EIR states that "Calpine personnel escorted FWARG archaeologists..." Why is the project proponent, Calpine, escorting the archaeologists? Why were tribal consultants not included in these field surveys? AD.45

The preliminary archaeological survey summarized in Table 4.5-1 is insufficient to determine the validity of statements such as that found on page 4-53, stating that "Any impacts to the prehistoric quarry located within the wellfield and power plant area as a result of surface disturbance may be avoided by placing the production/ injection line a minimum of 100 feet from this prehistoric site." This site has not been adequately evaluated to date. AD.46

The preliminary archaeological survey appears to be superficial and haphazard, and the number of acres surveyed seem insufficient, particularly for signficant areas such as Dry Lake where 300-400 acres of survey would be more appropriate. The only remedy for this would be a complete survey of the area *before* any decision to commit resources or grant any license, in order to know what would be impacted. AD.47

At 4-56 we read that "it is recommended that no evaluation of the historic site identified at the wellfield and power plant site be undertaken, provided that the proponent's use of USFS Road 44N64 remains ordinary." It is impossible from the information given to understand what is at stake here. AD.48

Again at 3-46 the EIS/EIR indicates that a sampling survey for the eight potential transmission line routes would be used to analyze the potential impacts of the proposed and alternate transmission line corridors. "<u>After</u> a specific transmission line corridor is chosen, Class III intensive surveys will be conducted prior to construction. These intensive pedestrian surveys will provide <u>complete inventories</u> of the cultural resources within the corridor..." This information needs to be developed in such a way that it can be included in the decisionmaking process, not *after* a decision has already been made. AD.49

Also at 4-53, "Placement of the freshwater pipeline is not expected to have any effects upon cultural resources in the area because of the lack of cultural resources located along the corridor." It is hard to tell what is meant here. If the freshwater pipeline runs from Arnica Sink to the power plant site, this traverses some extremely sensitive areas, both culturally and ecologically, since it would be an intrusion into a Roadless Area. There are burial sites north of the Medicine Lake Lava Flow and sites throughout the fresh water line corridor, including gathering sites for traditional foods and medicines. Arnica Sink was identified as having a traditional hunting lodge on the northwest side. AD.50

Also, it is highly misleading to say that Alternative 6 will avoid the A1 segment since the freshwater pipeline will run from Arnica Sink to the power plant. The freshwater pipeline would have visual impacts on the Roadless areas which it would traverse. AD.51

Under Alternatives in Section 4.5 (EIS/EIR at 4-57 and 4-58), Segments C2 and C1 contain significant archaeological features that have not yet been evaluated. Therefore statement that equate the two segments cannot be substantiated. AD.52

The methodology discussed at EIS/EIR 3-47 indicates that only 43.8 acres were covered by the preliminary survey for segment C1, and 44.3 acres for C2. Given the significance of the Dry Lake area, a more intensive survey is indicated. For those sections of the corridor outside the MLH, C1 and C2 contain extremely important areas. Archaeological site records should have indicated the levels of significance of those sites. AD.53

The C2 area around Dry Lake is a very significant archaeological resource containing traditional Modoc hunting blinds, village sites and burial grounds. This is a very unique and complex cultural district. The effects of transmission lines and substations would have an extremely significant adverse impact. Statements such as "All of the impacts would be less than significant after mitigation" (EIS/EIR at 4-57) are unsupportable since evaluations have not been done and mitigation measures not been arrived at in consultation with the Tribes. National Register Bulletin 38 makes clear that standards for traditional cultural properties are to be arrived at in consultation with the Tribes. AD.54

Also, at 4-75, the EIS/EIR states that "The wellfield and power plant site construction would not affect any archaeological sites." This cannot really be stated because the evaluation of Fourmile Hill has not yet been completed in the field work. Fourmile Hill will be surveyed in early October and may demonstrate the presence of traditional cultural properties with archaeological evidence. AD.55

10. Ethnographic Report. The Ethnographic Report is fairly adequate as far as it goes. However, a major problem has been lack of access to archaeological records (see section on Archaeology above). AD.56

The Ethnographic Report lacks in-depth study of culturally important natural resources. These include medicinal plants, native food plants, and identification of significant gathering areas for these resources, especially with regard to the Pit River Tribe whose members traditionally use those areas. Also, it should be mentioned that for Native People, all natural resources are cultural resources, since the landscape and our relationship to it is an interconnected whole. As a result, impacts to natural resources are also impacts to cultural resources. For example, by-products settling out of the steam released from the cooling towers would have long-term adverse effects on the natural resources of the area, as these natural resources are ingested or used not only by the wildlife but also the AD.57

Native People. Evaluation of impacts to these natural resources from a cultural point of view is lacking in the EIS/EIR.

The Ethnographic Report is inadequate in its treatment of the association of the Project Area with with the Modoc Wars; also the area's association with the round-up of the Pit River people in the 1850's when Tribal People went there for refuge; Chief White Horse of the Ajumawi Band and Buckskin Jack of the Atsuge Band were connected to these events. AD.58 The Ethnographic Report also does not treat archaeological features associated with sacred sites and known burial sites. The exact location not yet identified because of lack of access to archaeological records. AD.59

The interviews that were done were adequate, but the Forest Service has put limits on new information that can be provided. They have asked that no new sites be identified, though some additional sites were identified and recorded during the field survey. And the Forest Service has prevented its consultant (Dr. Dorothea Theodoratus) from doing any new interviews other than with the persons originally contacted in the original interview process during the Summer of 1996. As a result, certain important traditional people have not been consulted, particularly Willard Rhoades, the Spiritual Leader of the Pit River Tribe, and others. Interviews should be ongoing whenever another cultural consultant is identified until the ROD. AD.60

11. Other issues

The EIS/EIR at 3-140 states that an Environmental Impact Statement is needed for entry into Roadless Release Areas. Not only segment A2 of the transmission line would cross the Mount Hoffman Roadless Area, but also the freshwater pipeline from Arnica Sink to the Power Plant at Fourmile Hill. The EIS/EIR does not make it clear how the impacts to Roadless Areas will be treated and how the scoping, public input and decision process will be carried out. As with amendments to the Forest Plans, entries into Roadless Areas should be evaluated in a separate EIS process where the impacts are disclosed and input solicited specifically for this action. AD.61

There is an overall lack of data on vegetation. This of special concern to us, because there are a number of traditionally used plants that should be considered in the evaluation of impacts. The Fourmile Hill project area is a very important gathering area for matsutake and other mushrooms. At 3-73, although the EIS/EIR claims that the false morel "would not likely be found in the project vicinity," we have seen many false morels in the Fourmile Hill project area and in the entire Highlands. AD.62

Information is mentioned in various places of the EIS/EIR that has bearing on Native American cultural resources. For example, at 4-57, mitigation measures mention "maps of sensitive cultural resources that clearly outline significant site boundaries." These maps should be provided to the tribes, not as part of mitigations but in order to give us access to information you have about our cultural resources. All cultural information should be shared with the affected Tribes, including archaeological site records, preliminary archaeological surveys, etc. Tribal groups should have access to records, maps and information in order to better evaluate our own cultural resources. Agencies and project proponents should be aware that they are imposing a burden on the Tribes by proposing projects in sensitive cultural areas. AD.63

In conclusion, these comments only partly reflect issues regarding the Fourmile Hill project and the other geothermal projects proposed for the Medicine Lake Highlands. It is our deep prayer that you will hear the concerns of the Native People in the role given to us by the Creator to be the caretakers of this land. AD.64

Thank you, sincerely,

Floyd J. Buckskin

Floyd J. Buckskin
Headman, Ajumawi Band
Cultural Spokesperson, Pit River Tribe

FJB:mb
Enclosures: Appendices

cc: Advisory Council on Historic Preservation
California State Historic Preservation Officer
Native American Heritage Commission
Office of American Indian Trust
Office of Environmental Justice
Charles M. Miller, Esq.

APPENDIX

Excerpts from Section 106 of the National Historic Preservation Act

The language of Section 106 of the National Historic Preservation Act as amended (16 USC §§ 470f) is as follows:

> The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking, or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking." (emphasis added)

"Section 106 applies to all properties already listed in the National Register, to properties formally determined eligible for listing, and to properties not formally determined eligible but that meet specified eligibility criteria. This means that properties that have not yet been listed, and even properties that have not yet been discovered, can be eligible for consideration under Section 106 (emphasis added). Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 6.

"Another Section 106 principle has to do with timing. It is important that consideration of historic properties occur in the early stages of project planning so that preservation concerns can receive thorough consideration..." (emphasis added). Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 8.

Department of the Interior regulations (36 CFR Section 60.4) on the National Register criteria for listing:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that (a) are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction; or (d) that have yielded or may be likely to yield information important in history of prehistory.

"Under Section 110, all Federal agencies must carry out their programs in accordance with, and in furtherance of, national historic preservation policy; designate historic preservation officers to coordinate the agencies' activities under the act; identify and preserve historic properties under their ownership or control..." Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 5.

"Special social and cultural values related to historic properties are often important to Native American groups and local communities.... The regulations [36 CFR 800] encourage agencies to consider intangible social and cultural values related to historic properties. The regulations provide for traditional cultural leaders and other Native Americans to be brought into the consultation process when historic properties of importance to them may be affected. [Sections 800.1(c)(2)(iii), 800.4(a)(1)(iii), 800.5(a), and 800.5(e)(1)(ii); see also Sections 800.7, 800.11, and 800.13]

"Consideration of the effects of Federal undertakings on historic properties under Section 106 consists of five basic steps: identification and evaluation of the historic properties; assessment of the undertaking's effects; consultation to avoid, reduce, or minimize adverse effect; Council comment; and the final agency decision about whether and how to proceed. Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, pages 14-15.

Agency responsibility
"Carrying out the tasks involved in the identification of historic properties — properties included in or eligible for inclusion in the National Register — is the responsibility of the agency official with direct or indirect jurisdiction over the undertaking. [Section 800.4] ... Council regulations state that efforts to identify historic properties should follow the Secretary of the Interior's "Standards and Guidelines for Archaeology and Historic Preservation." [Section 800.4(b)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 17.

Determining that an action constitutes an undertaking
"Before beginning identification work, the agency first establishes that its proposed action constitutes an "undertaking." [Section 800.4(a)(1)] That is, the agency determines whether the proposed action could result in changes in the character or use of any historic properties,in the event any such properties are located in the area of potential effects. [Section 800.2(o)] (emphasis added) Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 17

Determining the area of potential effects
"The agency must also determine the 'area of potential effects,' which is defined in Council regulations as 'the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.' [Section 800.2(c)]It is not necessary to know that the area in question contains historic properties, or even to suspect that such properties exist, in order to recognize the area as the area of potential effect....

"The area of potential effects need not be a contiguous area; it can include multiple alternative project sites or multiple areas in which possible changes are anticipated. For example, the area of potential effects ... might include alternative construction corridors; locations from which borrow material might be obtained; areas where access might be provided to archaeological sites, resulting in their disturbance by artifact seekers; areas where visual or audible changes could occur; and areas where the project could result in modified traffic patterns that might affect ... historic districts." (emphasis added throughout) Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 18

Tasks involved in identification
—assessing what information the agency needs [Section 800.4(a) and Section 800.4(a)(1)(i) and (iii), also 800.4(a)(2)

—locating historic properties
"Based on its assessment of existing information and further needs, the agency then moves on to the second task, which is to make a reasonable and good faith effort to actually locate historic properties that may be affected by the undertaking and to gather enough information to evaluate their eligibility for inclusion in the National Register. This effort is carried out in consultation with the SHPO and should be consistent with the Secretary of the Interior's 'Standards and Guidelines for Archaeology and Historic Preservation.' The specific standards applicable to this stage of Section 106 review are the Secretary's "Standards and Guidelines for Preservation Planning," published at 48 FR 44716-44720 and the Secretary's 'Standards and Guidelines for Identification,' published at 48 FR 44720-44723." Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 20-21

Surveys and predictive models
"When large areas of potential effects are involved, an agency may find it useful to prepare a predictive model — that is, a set of predictions about where historic properties of different kinds are likely to occur, based on background data — and then to orient its survey work to test this model....

"In some cases, agencies may find it useful to identify and consider 'classes' of historic properties...if an undertaking will have difficult-to-define effects on a large area...[where] it may not be feasible to identify all individual properties subject to effect... It may, however, be possible to predict that the undertaking will affect certain kinds of archaeological sites [for example]... Knowing that such effects will occur, it may be possible to develop systems to protect the significant characteristics of such properties. Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, pages 21-22

Evaluating eligibility
When properties are found that may be historic but have never actually been evaluated, it is the agency's responsibility to complete the final task, which is to ascertain whether the properties are eligible for the National Register. To determine whether a property is eligible, the agency reviews the property with reference to the National Register listing criteria [see above]... The regulations require that agencies also follow the Secretary of the Interior's

'Standards and Guidelines for Evaluation,' published at 48 FR 44723-44726 [Section 800.4(c)(1). In addition, the regulations require that the agency's determination be made in consultation with the SHPO, but if the SHPO does not provide views as to the eligibility of properties, the SHPO is presumed to agree with the agency's determination. [Section 800.4(c)(5)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 22.

Agency action when historic properties are found

"If the agency finds one or more historic properties that its undertaking could affect, the agency proceeds to...assessing effects. [Section 800.4(e)] ... [T]he agency consults with the SHPO to decide this and takes into account the views of any interested persons. [Section 800.5(a)] The agency's judgment about whether there could be an effect is based on the criteria of effect and adverse effect, which are found in the Council's regulations. [Section 800.9] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 23-24.

Criterion of Effect [Section 800.9(a)]

"An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. For the purpose of determining effect, alteration to features of a property's location, setting, or use may be relevant depending on a property's significant characteristics and should be considered."

Criteria of Adverse Effect [Section 800.9(b)]

"An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting , materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

(1) Physical destruction, damage, or alteration of all or part of the property;
(2) Isolation of the property from or alterations of the character of the property's setting when the character contributes to the property's qualification for the National Register;
(3) Introduction of visual, audible, or atmospheric elements that are out of character with the character of the property or alter its setting;
(4) Neglect of a property resulting in its deterioration or destruction; and
(5) Transfer, lease, or sale of the property." (emphasis added) [NOTE: for a lease, an exception is made if "adequate restrictions or conditions are included to ensure preservation of the property's significant historic features." [Section 800.9(c)]

Finding of no effect: The agency must notify the SHPO and any interested persons who have made their concerns known...[or] parties with whom the agency has consulted during identification that there has been a finding of no effect; and compile the documentation that supports the finding and make that documentation available for public inspection. [800.5(b) and 800.6(e)(1)]

If there is adverse effect: The agency proceeds with the next step, consultation. [Section 800.5(e)] Interested persons must be invited to join the consultation under some circumstances, and may be invited to do so in other cases at the discretion of the agency, the SHPO, and the Council. The regulations specifically identify traditional cultural leaders and other Native Americans as interested parties when historic properties of significance to such persons are involved, either within or beyond the boundaries of Indian lands. [Section 800.1(c)(2)(iii)] The regulations more generally identify "the public" as interested persons. [Section 800.1(c)(2)(iv)] Members of the public who often participate in consultation include local historical, historic preservation, and archaeological organizations; civic and business associations, neighborhood organizations; and individuals concerned with historic properties in the area of potential effects. (summarized from Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, pages 29-36)

Purpose of consultation and consideration of alternatives

"Consultation brings together these principal parties to consider ways to avoid, reduce, or mitigate the adverse effects of the undertaking on historic properties.... Consultation typically gives first consideration to alternative ways of accomplishing the agency's goals without unacceptably damaging historic properties. Alternate sites, alternate undertakings, and alternate designs are typically addressed in an agency's planning process as well as during consultation. The alternative of not carrying out the undertaking at all should also always be considered in weighing the importance of the undertaking against the severity of its effects." Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 36

The Memorandum of Agreement (MOA)

"In most cases, the consulting parties can agree on ways to accommodate historic preservation concerns as the undertaking proceeds. The product of consultation in such a case is a Memorandum of Agreement (MOA) that contains stipulations specifying how the undertaking will be carried out in order to avoid or mitigate adverse effects or accepting such effects....

"When an undertaking will affect Indian lands, the governing body of the responsible Indian tribe must be invited to concur in the MOA. [Section 800.1(c)(2)(iii)] Although the regulations do not require that other consulting parties be invited to concur in the MOA, the agency, the SHPO, and the Council ... may agree to extend such an invitation. [Section 800.5(e)(4)]"
Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 38.

If consultation fails

"The Council encourages agencies to use consultation to the fullest extent practicable, but if, having engaged in consultation, the parties cannot agree on terms for an MOA, the consultation may be terminated.... If this should happen, the agency official must request the Council's comments on the undertaking, notifying all other consulting parties of its request and providing the Council with specific forms of documentation." [Section 800.5(e)(6)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, pages 38-42. On pages 40-41 are listed the documentation required for Council comment.

Agency's response to Council comments

"Absent an MOA, the agency must take into account the Council's written comments and then make a final decision about how (or whether) to proceed with its undertaking...." [Section 800.6(c)(2)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 42.

Agency foreclosure of the Council's opportunity to comment

"This situation is most likely to arise if an agency has proceeded with work on an undertaking before Section 106 review has taken place and the consideration of alternatives or mitigation is therefore no longer practicable. In such a case, Council comment would be moot, since it would by impossible for the agency to in corporate Council recommendations or suggestions into planning or execution of the undertaking.... [Section 800.6(d)(1) and (2)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, pages 42-43.

Public requests for Council review

"There are several points in the Section 106 Process at which any person, regardless of their formal involvement in the process, can request Council review of an agency' findings. [Section 800.6(e) Such review may address:

—Identification of historic properties...
—Evaluation of historic significance of properties...
—Finding that no historic properties are present...
—Finding no effect on historic properties...

When requested, the Council completes a review within 30 days of the request and advises the agency, SHPO, and requestor of the results. [Section 800.6(e)(1)] In light of the Council's views, the agency should reconsider its finding...

When an inquiry concerns an agency's judgment about National Register eligibility of a potential historic property, the Council refers the matter to the Secretary of the Interior, who is responsible for issuing formal determinations of National Register eligibility. [Section 800.6(e)(3)] Advisory Council on Historic Preservation, Section 106, Step-by-Step, 1986, page 43.

APPENDIX

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

Memorandum of Understanding
Between the
U.S. Department of Agriculture, Forest Service
and the
Advisory Council on Historic Preservation

WHEREAS, the United States Department of Agriculture, Forest Service manages the National Forest System and among other things, is directed by Congress to develop land use plans for this system under the Renewable Resources Planning Act of 1974 (88 Stat. 476; 16 U.S.C. 1601-1610) as amended by the National Forests Management Act of 1976 (90 Stat. 2947); and

WHEREAS, the Advisory Council on Historic Preservation and the United States Forest Service have met and reviewed the land use planning process of the Forest Service and its relation to compliance with Section 106 of the National Historic Preservation Act (80 Stat. 915, 16 U.S.C. s470f) and Executive Order 11593, May 13, 1971, "Protection and Enhancement of the Cultural Environment," as implemented by the Council's "Procedures for the Protection of Historic and Cultural Properties,".(36 C.F.R. Part 800) (hereafter "Procedures"); and

WHEREAS, in order to implement its responsibilities under the Resources Planning Act, the Forest Service prepares a number of plans in order to localize and refine national, regional, and agency-wide goals and policies for land under Forest Service jurisdiction and control and these plans include Area Guides, Forest Land Management Plans, Unit Plans, Resource Plans, and Project Plans; and

WHEREAS, Area Guides, Forest Land Management Plans, some Unit Plans and some Resource Plans, as defined in applicable Forest Service documents, do not directly authorize or result in activities that may have an effect on properties included in or eligible for inclusion in the National Register of Historic Places; and

WHEREAS, some Unit Plans, Resource Plans and Project Plans, may authorize land disturbing activities that may have an effect on properties included in or eligible for inclusion in the National Register of Historic Places; now

THEREFORE, it is mutually understood that:

(1) Area Guides and Forest Land Management Plans do not have an effect on properties included in or eligible for inclusion in the National Register of Historic Places as defined in Section 800.8 of the Council's Procedures.

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of

(2) Unit Plans and Resource Plans that do not directly authorize land disturbing activities do not have an effect on properties included in or eligible for inclusion in the National Register of Historic Places as defined in Section 800.8 of the Council's Procedures.

(3) Unit Plans that directly authorize land disturbing activities which may have an effect on properties included in or eligible for inclusion in the National Register of Historic Places will be subject to review in accordance with the Council's Procedures.

(4) Individual Project Plans and Resource Plans authorizing land disturbing activities will be subject to review in accordance with the Council's Procedures.

(5) The Council, pursuant to its Procedures, may comment on any Area Guide, Forest Land Management Plan or Unit Plan that in its judgment may have an effect as defined in Section 800.8 on properties included in or eligible for inclusion in the National Register of Historic Places and the Forest Service agrees to provide the Council with copies of environmental statements prepared pursuant to the National Environmental Policy Act.

(6) The Advisory Council and the Forest Service agree to consult on changes to the Forest Service Manual and directives to the field that will reflect this Memorandum of Understanding.

(7) The Forest Service and the Council shall review the provisions of this Memorandum on an annual basis to determine whether modification or termination is appropriate. Should the current land use planning process of the Forest Service be revised or suspended, the Forest Service shall inform the Council and they shall mutually determine whether the provisions of this Memorandum shall continue to apply.

Clement M. Silvestro (Date) February 25, 1977
Clement M. Silvestro
Chairman, Advisory Council on Historic Preservation

John R. McGuire (Date) 5/19/77
Chief, Forest Service
U.S. Department of Agriculture

VIA FAX

Mr. Randall Sharp
Fourmile Hill Geothermal Project
September 28, 1997
Page 20

ADDITION to Comments submitted by Floyd J. Buckskin, Pit River Tribe

This letter incorporates by reference for purposes of legal standing the comments and concerns of the signatories to the attached letter dated September 21, 1997 asking for an extension of the comment deadline. Incorporation by reference refers to comments made by individuals as well as organizations on the attached letter, as well as Philip Woodward, Louise Thompson, Suzanna and Peder Cuneo, other members of the Medicine Lake Citizens for Quality Environment, and the Fall River Resource Conservation District. AD.65

LAWRENCE CANTRELL
TRIBAL CHAIRMAN

DIANE TAYLOR
TRIBAL SECRETARY

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20258 Tamarack Avenue
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TELEPHONE
(916) 335-5421
(800) 304-9834
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Letter AE

ELEVEN AUTONOMOUS BANDS

September 30, 1997

Randall Sharp, Project Leader
Fourmile Hill Geothermal Development
USFS/BLM --800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing in strong opposition to geothermal development in the Medicine Lake Highlands and in support of the Native American Tribes whose sacred lands are being threatened by geothermal developments. I support the Pit River, Modoc, Klamath and Shasta Tribes in their opposition to these developments which would have devastating impacts on the sacred character of the whole Medicine Lake Highlands; on many individual sites and cultural resources; on the water quality of Medicine Lake and the many springs, creeks, and rivers that have their sources in the Highlands; on the animals, their habitats and migration routes; on the trees and plants; on the visual and air quality; and on the peace and natural beauty of the area. AE.1

I am concerned that the 300 megawatt transmission line has the potential to serve six power plants like the one being proposed as the Fourmile Geothermal Development. AE.2 The combined impacts are not being addressed in the current Environmental Impact Statement. AE.3 The developers do not know the results of disturbing an active volcanic area. AE.4 They have not sufficiently tested the potential hazards to water, air and life according to law. AE.5 There is no demonstrated need for the project, and no economic feasibility study.

We invoke the US Government's Trust Responsibility to the Indian Peoples of this land, the Executive Order on Indian Sacred Sites, the Executive Order on Environmental Justice, the American Indian Freedom of Religion Act, the National Historic Preservation Act, and National Register Bulletin 38 on Traditional Cultural Properties. The environmental document you have prepared states that impacts to Native American cultural values will be significant and adverse. Geothermal development is incompatible with existing long-standing spiritual and cultural uses of the area and its national resources. The government itself according to its own laws must not permit this development. AE.6

ATSUGEWI

The Medicine Lake Highlands are a traditional haven to Native American People and have been used as religious, ceremonial, and gathering grounds for thousands of years. They are highly significant to the cultural continuity of the Tribes of Northern California and Southern Oregon.

The "No Action" alternative is the only right decision regarding this development that would devastate Native American sacred lands. AE.7

Sincerely,

Arnold Wilkes
Vice-Chairman
Pit River Tribe

AW:dh

cc: Senator Barbara Boxer
112 Hart Senate Office Building
Washington, DC 20510

Senator Dianne Feinstein
331 Hart Senate Office Building
Washington, DC 20510

Native Coalition
P.O. Box 1143
Mount Shasta, CA 96067

Pacific Gas and Electric Company

Shasta Hydro
20818 Black Ranch Road
Burney, CA 96013
916/335-5615
Fax 916/335-5655

R. John Sandhofner
Superintendent

Letter AF

September 15, 1997

Mr. Randall M. Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project
EIS/EIR Coordinator
800 W, 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

PG&E has review the Draft Environmental Impact Statement Report (DEIS/EIR) for the proposed Fourmile Hill Geothermal Development Project. PG&E has concerns about the potential hydrologic impacts of the Fourmile Hill Geothermal Development Project and other geothermal developments being proposed near Medicine Lake, California. PG&E has expressed similar concerns about the Telephone Flat Geothermal Development Project.

PG&E owns and operates several hydroelectric projects in the Sacramento River Basin that are dependent on flows into the Fall and Pit Rivers. The Fall River, the largest tributary to the Pit River, drains a 612-square-mile watershed located in the volcanic terrain of the Modoc Plateau. The Fall River originates from Bear Creek and numerous large springs and spring-fed tributaries, including Spring Creek, Lava Creek, and the Tule River, Horr Pond, and Big Lake. With its tributary streams, the Fall River system comprises roughly 40 miles of streams flowing over flat terrain to its confluence with the Pit River at Fall River Mills.

AF.1

PG&E believes that there is a probable hydrological link between Medicine Lake area and the headwater springs of the Fall River . This conclusion is based on the fact that flows from the headwater springs into the Fall River are at consistent levels even during prolonged drought periods. On page 3-27 of the DEIS/EIR, it states that "recharge solely from precipitation over the surface area of the lava flow northwest of Fall River would be insufficient to support the flow volumes from the springs". Where the additional flow comes from is unknown. Changes in surface flows, aquifer linkages, and aquifer recharge due to the development of geothermal projects may have a direct and severe effect on PG&E's hydroelectric generation capabilities. A study should be conducted to confirm or deny the connection between the waters of the Medicine Lake area and the headwater springs in the Fall River drainage. The study should either refute or support the conclusion on page 3-26 that states:, "It is unlikely, therefore, that groundwater in the Fourmile Hill area communicates with groundwater on the south flank of the Medicine Lake volcano.

If you have any questions, please contact Dave Bowers at 916-335-5619.

Sincerely,

for John Sandhofner

John Sandhofner
Hydro Superintendent

Comments of

Plumbers & Steamfitters U.A. Local 342, Plumbers & Pipefitters U.A. Local 228 and Individual Union Members

on the

Fourmile Hill Geothermal Development Project
Draft Environmental Impact Statement
Draft Environmental Impact Report
(State Clearinghouse No. 96062042)

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September 30, 1997

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EXHIBITS

A – Comments of Dr. Phyllis Fox

B – Comments of Thomas Reid Associates

C – Comments of David Marcus

D – Letter from Richard Elliott, California Dept. of Fish & Game (June 17, 1997)

E – Letter from Richard Elliott, California Dept. of Fish & Game (May 24, 1995)

F – Letter from Joel Medlin, U.S. Fish & Wildlife Service

G – Letter from Richard Elliott, California Dept. of Fish & Game (July 9, 1996)

H – Excerpts from U.S. Fish & Wildlife Service, Pacific Bald Eagle Recovery Plan

I – Letter from George Turnbull, National Park Service, U.S. Dept. of Interior

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September 29, 1997

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Re: Comments on DEIS/EIR for Fourmile Hill Geothermal Development Project (SCH No. 96062042)

Dear Mr. Sharp:

We represent the Plumbers and Pipefitters, U.A. Local 228, the Plumbers and Steamfitters, U.A. Local 342 (the "Unions"), and John D. Coots, and James Gholson. These unions represent thousands of construction workers, many of whom live near, visit, or recreate in the Medicine Lake area. Messrs. Coots and Gholson are union members who regularly visit and recreate in the Medicine Lake area. AG.1

I. INTRODUCTION

The Unions and their members are interested in sustainable economic development. Continued environmental degradation may jeopardize future jobs by making it more difficult and more expensive for business and industry to expand in California, and by making it less desirable to live here. Continued degradation can, and has, caused construction moratoriums and other growth restrictions which, in turn, reduce future employment opportunities.

Additionally, construction workers themselves live in and use the areas that suffer the impacts of environmentally detrimental projects. Union members breathe the same polluted air that others breathe, and suffer the same health and safety impacts. Unions have an interest in enforcing environmental laws to protect these workers. AG.2

Construction workers are concerned about projects that cause serious environmental harm without providing countervailing economic benefits such as decent wages and benefits. Both the National Environmental Policy Act ("NEPA")[1]

[1] 42 U.S.C. § 4321 *et seq.*

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and the California Environmental Quality Act ("CEQA")[2] provide a balancing process whereby economic benefits are weighed against significant impacts on the environment. (40 C.F.R. § 1508.14; Cal. Pub. Res. Code § 21081(a)(3); 14 Cal. Code Regulations ("CCR") § 15131; *Citizens for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal.App.3d 151, 171 [217 Cal.Rptr. 893].)

We have reviewed the draft environmental impact statement/environmental impact report ("EIS/EIR") for the Fourmile Hill Geothermal Development Project ("Project") and submit the following comments on behalf of the Unions and the above-named individuals. In sum, the EIS/EIR fails to properly analyze and mitigate the Project's impacts on geology/soils, hydrology, geothermal resources, cultural resources, Native American culture, vegetation, wildlife, visual quality, land use and recreation, air quality, noise, human health and safety, socioeconomics, and transmission system reliability. The EIS/EIR's analyses of cumulative impacts and Project alternatives also fail to meet the standards of CEQA and NEPA. Thus, the EIS/EIR does not fulfill its function as an information and decisionmaking document. These issues are discussed more fully in later sections of these comments. AG.3

These comments are supported by the expert analyses of Dr. Phyllis Fox of Russell Resources, Inc., Dr. Karen Weissman, Victoria Harris, and Wendy Poinsot of Thomas Reid Associates, and David Marcus. Dr. Fox holds a Ph.D. in Civil/Environmental Engineering and has extensive experience in analyzing environmental impacts associated with energy development projects, including impacts on air quality, hydrology, and public health and safety. Dr. Weissman has a Ph.D. in Biology and has prepared and reviewed numerous environmental impact studies and reports. Ms. Harris has been an environmental consultant since 1981, and has particular expertise in the fields of impact assessment and habitat conservation planning for rare and endangered species. Ms. Poinsot has been an environmental consultant since 1987, and has worked extensively with geotechnical reports, noise assessments, and cultural resource investigations. Mr. Marcus has an M.A. in Energy and Resources, and has a broad background in analyzing energy-related issues. The analyses of these experts can be found in Exhibits A through C, and are incorporated into these comments by reference. Their analyses should be responded to separately. AG.4

[2] Cal. Pub. Res. Code § 21000 *et seq.*

II. LEGAL STANDARDS FOR PREPARING EIS/EIRS

A. Purpose of EIS/EIR

CEQA and NEPA confer a "privileged position" upon members of the public based on the belief that they can make important contributions to environmental protection. (*Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agric. Ass'n* (1986) 42 Cal.3d 929 [321 Cal.Rptr. 748], quoting Selmi, *The Judicial Development of the California Environmental Quality Act* (1984) 18 U.C. Davis L.Rev. 197, 215-216; *accord Robertson v. Methow Valley Citizens Council* (1989) 490 U.S. 332, 349 [109 S.Ct. 1835].) The EIS/EIR process is "the principal method by which environmental data are brought to the attention of the agency and the public." (*Mira Monte Homeowners Ass'n v. County of Ventura* (1985) 165 Cal.App.3d 357, 365 [212 Cal.Rptr. 127].) Hence, the EIS/EIR is primarily an informational document. (*Laurel Heights Improvement Ass'n v. Regents of the University of California* ("*Laurel Heights I*") (1988) 47 Cal.3d 376, 392 [253 Cal.Rptr. 426].)

The EIS/EIR process allows the public to review and comment on the impacts and proposed mitigation measures, and provides the agency with a basis for making findings to support its decision on the project. (*Sierra Club*, 7 Cal.4th at p. 1229; *Robertson* 490 U.S. at p. 349; Adler *v. Lewis* (9th Cir. 1992) 675 F.2d 1085, 1096.) "The ultimate decision of whether to approve a project, be that decision right or wrong, is a nullity if based upon an EIR that does not provide the decision-makers, and the public with the information about the project that is required by CEQA." (*Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 829 [173 Cal.Rptr. 602].) AG.5

Two key functions of an EIS/EIR are to identify and describe every significant impact of a project and to propose feasible mitigation for each impact, if such mitigation exists. (Cal. Pub. Res. Code §§ 21002.1, 21100(a); *Sierra Club v. State Board of Forestry* (1994) 7 Cal.4th 1215, 1229 [32 Cal.Rptr.2d 19]; *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192 [139 Cal.Rptr. 396]; *Robertson*, 490 U.S. at pp. 348-352.)

B. Analysis of Impacts

The process of analyzing a project's impacts must be an interactive one between the public and the lead agencies. The process "must be open to the public, premised upon a full and meaningful disclosure of the scope, purposes, and effect of AG.6

a consistently described project, with flexibility to respond to unforeseen insights that emerge from the process." (*County of Inyo v. City of Los Angeles* (1984) 160 Cal.App.3d 1178, 1185 [207 Cal.Rptr. 425].)

CEQA "contemplates serious and not superficial or pro forma consideration of the potential environmental consequences of a project." (*Leonoff v. Monterey County Bd. of Supervisors* (1990) 222 Cal.App.3d 1337, 1347-48 [272 Cal.Rptr 372].) "Conclusory comments in support of environmental conclusions are generally inappropriate." (*Laurel Heights I*, 47 Cal.3d at p. 404; *see also Seattle Audubon Society v. Moseley* (W.D. Wash. 1992) 798 F.Supp. 1473, 1479, quoting *Silva v. Lynn* (1st Cir. 1973) 482 F.2d 1282, 1285.) "To facilitate CEQA's informational role, the EIR must contain facts and analysis, not just the agency's bare conclusions or opinions." (*Laurel Heights I*, 47 Cal.3d at p. 404, quoting *Concerned Citizens of Costa Mesa v. 32nd Agricultural Ass'n* (1986) 42 Cal.3d 929, 935 [231 Cal.Rptr. 748]; *see also Robertson*, 490 U.S. at p. 349; Adler *v. Lewis* (9th Cir. 1992) 675 F.2d 1085, 1096.)

The burden of this environmental investigation is placed on the government rather than the public. (*Sundstrom v. Mendocino County* (1988) 202 Cal.App.3d 296, 311 [248 Cal.Rptr. 352].) An agency is not allowed to "hide behind its own failure to gather relevant data." (*Ibid.*; *see also* p. 361 (sparseness of record suggests existence of significant issues); 40 C.F.R. § 1502.22.)

Lead agencies must thoroughly investigate potential project impacts. (*Seattle Audubon*, 798 F.Supp. at pp. 1479, 1482.) The agency "must use its best efforts to find out and disclose all that it reasonably can." (14 CCR § 15144.) Even if it is not feasible to do sophisticated technical analyses of impacts, the lead agency must perform less exacting analyses and report the results. (*Citizens to Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 432 [222 Cal.Rptr. 247].)

C. Mitigation Measures

To ensure that project impacts are genuinely addressed, an EIS/EIR must identify specific feasible, effective and enforceable mitigation measures for each significant impact. An EIS/EIR must identify all feasible mitigation measures for each significant environmental impact, if such measures exist. (Cal. Pub. Res. Code § 21100(b)(3); 14 CCR §§ 15126(c); *Robertson*, 490 U.S. at p. 352.) AG.7

The identification of mitigation measures fulfills an EIS/EIR's informational purposes, and also provides a basis for the decisionmaker to determine whether feasible mitigation measures or alternatives have been adopted which substantially lessen the project's impacts. (Pub. Res. Code §§ 21002, 21081; 14 CCR §§ 15002(a)(3), 15021(a), 15091(a)(1); *Robertson*, 490 U.S. at p. 351.) If an EIR fails to properly analyze mitigation measures or to discuss why no such measures are feasible, the agency cannot make the legally required findings. (*Ibid.*)

It is not enough for an EIS/EIR to assert that certain mitigation measures might be available and effective; an EIS/EIR must evaluate the feasibility of mitigation. (*Kings County Farm Bureau v. Hanford* (1990) 221 Cal.App.3d 692, 728 [270 Cal.Rptr. 650].) An agency may not rely on mitigation measures of uncertain feasibility or effectiveness. (*Kings County*, 221 Cal.App.3d at pp. 727-728.). Nor may it defer consideration of mitigation measures to later studies. (*Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 306-08 [248 Cal.Rptr. 352]).

In *Sundstrom*, the lead agency conditioned its approval of the project on the post-approval preparation of a hydrological study evaluating the project's potential impacts on downslope properties. This study would allow agency staff to develop specific mitigation measures. The court concluded that since the success of the mitigation was uncertain, the lead agency could not have made a reasonable finding that all potential impacts had been mitigated below a level of significance. (202 Cal.App.3d at pp. 306-308.) The court also found this deferral to violate several of CEQA's fundamental policies:

> By deferring environmental assessment to a future date, the conditions run counter to that policy of CEQA which requires environmental review at the earliest feasible stage in the planning process. . . . A study conducted after approval of a project will inevitably have a diminished influence on decision making. Even if the study is subject to administrative approval, it is analogous to the sort of post hoc rationalization of agency actions that has been repeatedly condemned in decisions construing CEQA. [citations]
>
> It is also clear that the conditions improperly delegate the County's legal responsibility to assess environmental impact by directing the applicant himself to conduct the hydrological studies subject to the approval of the Planning Commission staff.

* * *

> Finally, the use permit circumvents the provisions of CEQA governing the process of environmental review. . . . By merely requiring the administrative approval of the hydrological studies, the use permit provides no similar guarantee of an adequate inquiry into environmental effects. An EIR or negative declaration, moreover, are subject to review by the public and interested agencies. [citations] This requirement of 'public and agency review' has been called 'the strongest assurance of the adequacy of the EIR.' (*Ibid.*)

An EIS/EIR must also analyze any impacts caused by implementation of proposed mitigation measures. (14 CCR § 15126(c).) AG.8

In addition to the requirements of CEQA and NEPA, BLM regulations require geothermal operators to "comply with all Federal and State standards with respect to the control of all forms of air, land, water, and noise pollution." (43 C.F.R. § 3262.6.) The BLM has discretion to establish additional and more stringent standards. (*Ibid.*)

The Geothermal Resource Operational Orders ("GROs") require geothermal lessees to conduct operatons "in a manner that provides maximum protection of the environment; . . .[and] take all necessary precautions to protect the public health and safety . . . . " (GRO No. 4, introductory paragraphs.). "Operating plans shall be designed so that operations will result in the least disturbance of land, water, and vegetation." (*Id.* at § 2.) All operations shall be conducted "in such a manner as to afford reasonable protection of fish, wildlife, and natural habitat." (*Id.* at § 6.) AG.9

Here, the EIS/EIR fails to comply with legal requirements regarding the consideration of mitigation measures by deferring development of mitigation measures for several significant impacts until after project approval. The EIS/EIR's specific deficiencies will be discussed later in these comments.

D. Lead Agency Must Consider the *Whole* Project

An analysis of a project's environmental impacts depends on an accurate and complete description of the project. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App. 3d 185, 193 [139 Cal.Rptr. 396] ("An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR."); *City of* AG.10

Santee v. County of San Diego (1989) 214 Cal.App.3d 1438 [263 Cal.Rptr. 340]; *Rural Land Owners Association v. Lodi City Council* (1983) 143 Cal.App.3d 1013, 1024-1025 [192 Cal.Rptr. 325]; *Santiago County Water District v. County of Orange* (1981) 118 Cal.App.3d 818, 829-830 [173 Cal.Rptr. 602].) If the description of the project is inaccurate or incomplete, the EIR cannot be legally adequate. (14 CCR § 15063(d)(1); *Christward Ministry v. Superior Court* (1986) 184 Cal.App.3d 180, 197 [228 Cal.Rptr. 868]; *County of Inyo*, 71 Cal.App.3d at p. 193.)

A crucial component of an accurate project description is that it include the entire project. CEQA broadly defines the "project" which must be evaluated as "the whole of an action, which has a potential for resulting in a physical change in the environment, directly or ultimately . . . ." (*Citizens Ass'n For Sensible Development v. County of Inyo* (1985) 172 Cal.App.3d 151, 165 [217 Cal.Rptr. 893]; 14 CCR § 15378(a).)

Early in development of CEQA law, the California Supreme Court established that it is "the mandate of CEQA that environmental considerations do not become submerged by chopping a large project into many little ones--each with a minimal potential impact on the environment--which cumulatively may have disastrous consequences." (*Bozung v. Local Agency Formation Comm'n of Ventura County* (1975) 13 Cal.3d 263, 283-284 [118 Cal.Rptr. 249, 263]; *accord, City of Antioch v. City of Pittsburg* (1986) 187 Cal.App.3d 1333 [232 Cal.Rptr. 507]; *Rural Land Owners Ass'n v. Lodi City Council* (1983) 143 Cal.App.3d 103 [192 Cal.Rptr. 325].)

"A public agency is not permitted to subdivide a single project into smaller individual sub-projects in order to avoid the responsibility of considering the environmental impact of the project as a whole." (*Orinda Ass'n v. Board of Supervisors* (1986) 182 Cal.App.3d 1145, 1171 [227 Cal.Rptr. 688]; *accord San Joaquin Raptor v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 729-734 [32 Cal.Rptr.2d 704.) It is "[o]nly through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefits against its environmental cost . . . ." (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192 [139 Cal.Rptr. 396]; *Santiago County Water District v. County of Orange* 118 Cal.App.3d 818, 830 [173 Cal.Rptr. 602].)

The danger of piecemeal review of a large project is that there may never be a comprehensive consideration of the entire project's impacts. (*City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1452 [263 Cal.Rptr. 340, 348];

Citizens Ass'n, 172 Cal.App.3d at p. 166 [217 Cal.Rptr. at p. 902].) This is what will occur here if the lead agencies fail to consider the environmental impacts associated with expansion of geothermal production in the Glass Mountain KGRA.

Even when a project applicant seeks separate permits for different stages of a project, CEQA does not permit piecemeal review. "The term 'project' does not mean each separate governmental approval." (14 CCR § 15378(c).)[3] "The term *'project' refers to the underlying activity and not the governmental approval process.*" (*Orinda Ass'n*, 182 Cal.App.3d at pp. 1171-1172, quoting *Natural Resources Defense Council v. Arcata National Corp.* (1976) 59 Cal.App.3d 959, 969 [131 Cal.Rptr. 172] (emphasis in original).)

Thus, the lead agencies must assess the environmental impacts of all foreseeable geothermal development projects in the Medicine Lake area now, even if they intend to conduct additional environmental review in the future of either an expansion of the Calpine Project, or projects undertaken by others. Without an evaluation of all components of the Project, neither the public nor the lead agencies will know its true impacts.

In *Laurel Heights I*, the California Supreme Court held that an EIR must analyze the environmental effects of a future expansion where: AG.11

(1) it is a reasonably foreseeable consequence of the initial project; and
(2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental effects. (47 Cal.3d at p. 433.)

In this case, there can be no doubt that future expansion of geothermal production in the Glass Mountain KGRA is reasonably foreseeable, and that this expansion will change the scope of the project and its environmental effects. Therefore, such expansion must be discussed in the EIS/EIR.

[3] Under CEQA, related actions need not constitute formal proposals to trigger environmental analysis. (*Compare Kleppe v. Sierra Club* (1976) 427 U.S. 390; *cf. Environmental Defense Fund v. Marsh* (5th Cir. 1981) 651 F.2d 983, 999 fn. 13 ("We believe that *Kleppe* also leaves room for a court to prohibit segmentation or require a comprehensive . . . [program impact statement] for two projects, even when one is not yet proposed, if an agency has egregiously or arbitrarily violated the underlying purpose of NEPA.").)

III. PROJECT PIECEMEALING

The EIS/EIR is rife with references to expansion of geothermal production in the Glass Mountain KGRA. The EIS/EIR states that the geothermal resource has been estimated to have the potential to produce 500 MW of electricity over a 30-year period. (EIS/EIR, p. 2-38.) The scoping process has already begun for CalEnergy's proposed 48 MW generation plant. (EIS/EIR, p. 4-311.) And both Calpine and CalEnergy have publicly stated that, if the resource proves out, they will expand their geothermal production capacities.[4]

AG.12

The EIS/EIR states that development of the KGRA's 500 MW potential "is not considered to be reasonably foreseeable at this time." (EIS/EIR, p. 2-38.) This is based on the fact that only two projects totalling 90 MW are currently under consideration. (*Ibid.*) But other references in the EIS/EIR indicate that significant expansion is, in fact, reasonably foreseeable.

The clearest example of this foreseeability is the proposal to build a transmission line with capacity to handle 300 MW of electricity. (EIS/EIR, p. 2-38.) The EIS/EIR claims that the Forest Service requested that the transmission line "be designed to accommodate not only the net electrical power output of 44.9 MW from the proposed project, but also reasonably foreseeable geothermal power generation that could occur at the Glass Mountain KGRA." (EIS/EIR, p. 2-37; *see also* p. 2-38 (230 kV line chosen over a 115 kV line because the 115 kV line "either could not transmit, or would uneconomically transmit, the proposed effective capacity [145 MW] of the line."); p. 2-77 (low-voltage lines rejected because, among other things they "may not adequately accommodate future development"); p. 2-76 (230 kV line chosen to accommodate potential future development in the KGRA); Comments of Thomas Reid Associates, Ex. B, § 2.0; Comments of David Marcus, Ex. C, Comments 2, 3, 4, 8.)

AG.13

When the Forest Service analyzed the environmental impacts of geothermal leasing, it analyzed the impacts of all leasing activities within the Glass Mountain KGRA. (Supplemented Environmental Assessment: Geothermal Leasing of National Forest System Lands in the Glass Mountain Known Geothermal Resource Area (Sept. 1984) There is no reason why a similar approach cannot be taken for geothermal production.

AG.14

[4] Statements of Calpine and CalEnergy representatives at conference entitled "An Introduction to Geothermal Energy and Development at Medicine Lake" in Klamath Falls, Oregon (July 22-23, 1997.)

The EIS/EIR attempts to explain away this failure to analyze other geothermal development projects on the basis that the Calpine has not "induced" other projects, and that other projects are being independently proposed and processed. (EIS/EIR, p. 4-331.) This does not alter CEQA's mandates against piecemealing of projects. The fact that private entities are proposing separate projects does not alter the fact that these projects are inextricably intertwined. They are geographically related and will use and impact common resources (*e.g.*, geothermal reservoir, forest, visual, air quality, Native American values). The Forest Service and BLM will be making the ultimate decisions about whether these projects should proceed, and these decisions clearly are related federal actions. (*E.g., Minnesota Public Interest Research Group v. Butz* (8th Cir. 1976) 541 F.2d 1292, *cert. denied*, 430 U.S. 922.)

Failure to analyze the potential impacts associated with all reasonably foreseeable production activities violates CEQA's mandate that environmental review not be circumvented by chopping projects into little pieces. The fact that the other projects are not as defined as Calpine's is no justification for failing to analyze these impacts. (*See, e.g., City of Antioch v. City Council* (1986) 187 Cal.App.3d 1325 [232 Cal.Rptr.507] (the lack of specific development proposals does not negate the fact that installing major infrastructure has growth-inducing effects that should be analyzed; EIR would simply be less specific and more focused on secondary impacts than an EIR prepared for a specific proposal).)

AG.15

The EIS/EIR should be revised to evaluate all reasonably foreseeable production activity within the Glass Mountain KGRA. Otherwise, the public and agency decisionmakers may not know the full impacts of this development until it is too late.

IV. GEOLOGY AND SOILS

A. **Subsidence at Arnica Sink**

The EIS/EIR concludes that water withdrawals from Arnica Sink would not cause ground subsidence. (EIS/EIR, pp. 4-6-7.) This conclusion is based on "the relatively small amount of groundwater that would be withdrawn and the short time required to recharge the groundwater resource." (EIS/EIR, p.. 4-7.) However, according to Dr. Fox's calculations, the Project would lower the water table in Arnica Sink by withdrawing groundwater and eliminating local recharge. (Ex. A,

AG.16

Comment 8.b.) Thus, the basis for the EIS/EIR's conclusion that there would be no significant impact is flawed. This impact should be reassessed, along with appropriate mitigation strategies, and included in a recirculated EIS/EIR. (*See* Ex. A, Comment 8.b., for mitigation options.)

B. Slope Instability and Fire Risk

Construction of the proposed transmission line and associated access roads could cause slope instability, especially where it traverses steep slopes (50-100%). (EIS/EIR, p. 4-11.) This slope instability could trigger transmission line problems during Project operation, including "line breakage, pole movement, and stsructural collapse. (EIS/EIR, p. 4-12.) Nevertheless, the EIS/EIR concludes that these impacts are not significant because of "the low potential for slope [in]stability", construction techniques, and limited risk to people and structures. However, this slope instability could increase the risk of fire and, thus, cause significant impacts to human health and safety. (*See* Comments under Human Health & Safety, Increased Fire Risk, below.) AG.17

C. Soil Impacts From Air Emissions

Section 4.2.11 of the EIS/EIR concludes that there will be no significant impact from the deposit of air emissions on soils. (EIS/EIR, p. 4-16.) According to Dr. Fox, however, deposition rates will be much higher than calculated in the EIS/EIR. (*See* Ex. A, Comments 8 and 12.) This section also failed to evaluate the impacts of Project-induced acid rain, which can acidify soils. (Ex. A, Comment 8.d.) Section 4.2.11 should be revised in light of Dr. Fox's comments and recirculated for public review and comment. AG.18

V. HYDROLOGY

The EIS/EIR does not contain sufficient information and analysis that would enable the public and decisionmaker to assess the Project's impact on hydrologic resources. (*Adler*, 675 F.2d at p. 1096; *Robertson* 490 U.S. at p. 349; *Sierra Club v. United States Army Corps of Engineers* (2nd. Cir. 1983) 701 F.2d 1011, 1029; Cal. Pub. Res. Code § 21061; 14 CCR § 15151.) The EIS/EIR's conclusion that the Project's impact would be insignificant is not based on scientific and factual data. Additionally, because the EIS/EIR's analysis is flawed in several respects, it substantially underestimates the Project's effects on water quality and groundwater recharge. Hence, the EIS/EIR is deficient as an informational document. AG.19

Further, significant impacts have been overlooked in the EIS/EIR. The EIS/EIR must be revised to address these significant effects and recirculated for public review and comment. (Cal. Pub. Res. Code § 21092.1; 14 CCR § 15088.5; *Laurel Heights Improvement Association of San Francisco v. Regents of the University of California* (1993) 6 Cal.4th 1112, 1130.) The significant effects are summarized below.

A. Failure to Recognize Arsenic Deposition on Medicine Lake as a Significant Impact

According to the CEQA Guidelines, a project may have a significant effect on the environment if it will substantially degrade water quality. (CEQA Guidelines, App. G(f).) The federal regulations implementing the U.S. Geothermal Steam Act of 1970 provide that the operator shall comply with all federal and state standards relating to control of air, land, water and noise pollution. (43 C.F.R. § 3262.6.) The EIR/EIS had concluded that air depositions would not significantly affect Medicine Lake's water quality because contaminants would be diluted below concentrations that would affect water quality. (EIS/EIR, p. 4-34.) The EIR/EIS evaluated the significance of deposition by comparing contaminant concentrations to drinking water maximum contaminant levels (MCLs) or suggested no-adverse-response levels (SNARLs). (EIS/EIR, Table 4.3-3, p. 4-36.) The EIS/EIR, however, did not use the correct significance standards to evaluate the Project's impact. AG.20

Dr. Phyllis Fox undertook an extensive analysis of Project-related air emissions on Medicine Lake. Dr. Fox has determined that the EIR/EIS's analysis is severely flawed and substantially underestimates the Project's impacts on Medicine Lake. The following is a summary of the significant effects that were overlooked or understated in the EIS/EIR, as discussed in detail in the comments of Dr. Fox. Dr. Fox's comments, which are attached to this letter as Exhibit A, are incorporated by reference in these comments.

The significance standards referenced in the EIS/EIR, the MCLs and SNARLs, are insufficient to evaluate the Project's impacts on human health. These criteria do not consider metal bioaccumulation in the food chain and human consumption of contaminated organisms. (Ex. A, comment 8a.) This is particularly important in an area such as Medicine Lake, where people consume fish from the lake. (Ex. A, comment 8a; EIS/EIR, p. 3-153.) To address this issue, the U.S. EPA promulgated human health criteria that considers these factors. (Ex. A, comment

8a; 40 C.F.R. 131.36(b)(1).) Also, the EPA has also recognized that the current MCL for arsenic is insufficient to protect human health and it is currently studying a more stringent standard. (Ex. A, comment 8a.) Given these factors, the EIS/EIR should have used human health criteria in its analysis of the air emissions on water quality. (*Ibid.*)

When the correct significance standard is used to evaluate the Project's effect on Medicine Lake's water quality, the standard for arsenic is exceeded. The human health criteria for consumption of water and organisms is 0.018 ug/L. (40 C.F.R. 131.36(b)(1).) The estimated concentration of arsenic in Medicine Lake after the Project's 45-year life would be 12 ug/L, which is over 600 times higher than the level EPA says is required to protect human health. Similarly, the arsenic concentration would be over 85 times higher than the human health criteria for consumption of organisms only. (Ex. A, comment 8a.) Both of these human health criteria would be exceeded after only one year of the Project's operation. (*Ibid.*)

Thus, lead agency should recognize the Project would have a significant effect on Medicine Lake water quality because its air emissions would substantially elevate arsenic levels above significance standards. The EIS/EIR should be revised to include this significant impact and to propose appropriate mitigation measures.

B. Failure to Recognize Mercury Deposition on Medicine Lake as a Significant Impact

The EIS/EIR fails to recognize that Project-related mercury deposition on Medicine Lake is a significant impact because it exceeds significance standards designed to protect human health. As Dr. Fox discusses in her comments on Air Quality, the EIS/EIR substantially underestimated the Project's mercury emissions. (Ex. A, comment 8b.) When actual mercury emissions, which Dr. Fox estimates to be 52 lbs/year, are multiplied by a ratio of the EIS/EIR's estimated mercury concentration in Medicine Lake, the concentration exceeds the EIR/EIS's estimate by a factor of 55. Mercury levels also would exceed the EPA's human health criteria for the consumption of water and organisms and consumption of contaminated organisms only. (*Ibid.*; 40 C.F.R. 131.36(b)(1).) Therefore, the EIS/EIR has substantially underestimated the Project's impacts and it fails to recognize that mercury deposition would have a significant impact upon Medicine Lake's water quality and human health. AG.21

The EIS/EIR should be revised to include this significant impact and the lead agency should propose corresponding mitigation measures.

C. Failure to Identify Boron Deposition on Medicine Lake as a Significant Impact

The EIS/EIR fails to identify boron deposition as a significant impact on Medicine Lake. Dr. Fox's comments demonstrate that the EIS/EIR's analysis substantially underestimated boron emissions. (Ex. A, comment 8c.) Boron will cause an adverse effect on Medicine Lake's water quality that must be mitigated. AG.22

D. Failure to Identify Acid Deposition on Medicine Lake as a Significant Impact

The EIS/EIR fails to identify acid deposition (acid rain) as a potential significant impact on Medicine Lake water quality. In fact, the EIS/EIR fails to analyze this issue at all.

The EIS/EIR's failure to provide any information about the potential impact of acid rain is important because Dr. Fox has determined that the Project-related acid deposition would have a significant effect on Medicine Lake. (Ex. A, comment 8d.) The EIS/EIR estimates that the Project will deposit 4,500 lbs/year of sulfate on Medicine Lake. (EIS/EIR, Table 4.3-3, p. 4-36.) This corresponds to a sulfate deposition of rate of 10.6 lbs/acre-year. Minnesota, which is the only state that has promulgated an acid deposition standard, has limited sulfate deposition to 9 lbs/acre-year. (Ex. A, comment 8d.) The sulfate deposition from the Project thus exceeds the Minnesota standards. The Project's deposition rate is in the range where demonstrated significant effects occur. (*Ibid.*) Acid rain reduces lake water pH levels, which harms sensitive biota. (*Ibid.*) Also, the acid deposition on Medicine Lake could be substantially higher because the EIS/EIR substantially underestimated hydrogen sulfide emissions. (*Ibid.*) AG.23

The EIS/EIR should be revised to acknowledge acid deposition as a significant impact and to propose potential mitigation measures.

E. Failure to Identify Interference with Groundwater Supplies as a Significant Impact

A project may be deemed to have a significant effect on the environment if it will substantially degrade or deplete groundwater resources or interfere with AG.24

groundwater recharge. (CEQA Guidelines, App. G(h)-(i).) The EIS/EIR understates the Project's impact on groundwater supplies and overlooks significant impacts, as discussed in the attached comments of Dr. Fox. (Ex. A, comment 9.)

The Project could significantly affect the groundwater supply by totally eliminating local recharge, by reducing recharge in the Arnica Sink and by reducing recharge at the project site. (*Ibid.*) According to the standard of significance in the EIS/EIR, these are significant impacts that must be mitigated. (EIS/EIR, p. 4-21.)

F. Failure to Identify Interference with Local Surface Water Supplies as a Significant Impact

The EIS/EIR understates the Project's impact on local surface water supplies and overlooks significant impacts, as discussed in the attached comments of Dr. Fox. (Ex. A, comment 10.) The Project could significantly affect local surface water supplies by reducing recharge to Little Medicine Lake and other lakes and by reducing recharge to local springs. According to the standard of significance in the EIS/EIR, these are significant impacts that must be mitigated. (EIS/EIR, p. 4-21.) AG.25

G. Inadequate Discussion of Power Production Impact on Water Resources

The EIS/EIR asserts that the Project will not have a significant impact on water resources because there are no known connections between the geothermal sources and the groundwater aquifer. (EIS/EIR, pp. 4-33, 4-49.) However, this conclusion is based upon speculation and is contradicted by scientific evidence, as is discussed in the attached comments of Dr. Fox. (Ex. A, comment 11.) The lead agency should investigate this impact and develop adequate data to support its position. (*Ibid.*) AG.26

H. Failure to Identify Significant Impacts to Groundwater Quality

The EIS/EIR fails to discuss significant impacts to groundwater quality that result from geothermal brine spills, as discussed in the attached comments of Dr. Fox. (Ex. A, comment 12.) Geothermal brine, which contains high concentrations of toxic and hazardous substances, could significantly affect groundwater quality. The EIS/EIR should evaluate this impact and propose mitigation measures. AG.27

I. Inadequate Mitigation Measures

The EIS/EIR proposes mitigation to reduce the Project's impacts on water availability and quality. These mitigation measures are inadequate because they are vague, improperly defer impact assessment, and are insufficient to alleviate the Project's impacts.

Mitigation measure 4.3.1a, which states that applicant will submit a hydrologic monitoring plan for the caldera and a "defined local area" is inadequate for several reasons. (EIS/EIR, p. 4-26.) This measure does not provide sufficient detail regarding ongoing monitoring of groundwater quality and quantity. (Ex. D (6/17/97 letter from Richard Elliot, California Department of Fish & Game); Ex. E (5/24/95 letter from Richard Elliot, California Department of Fish & Game).) First, it does not identify the "defined local area." Thus, it is impossible to determine the area being mitigated. Second, the measure requires other geothermal developers to participate in the monitoring, but it does not state what will happen if the other developers refuse. (*Ibid.*) Third, the applicant proposes to collect water level and water quality data *prior to construction*. The applicant, however, should provide this information in the EIR so that the public and decisionmakers can properly assess this information now. Finally, the applicant proposes to reduce groundwater pumping rates if it will have a significant adverse impact on water availability *and* these impacts "can be attributed to project pumping of local groundwater." (*Ibid.*) By requiring adverse effects to be directly attributed to the applicant, the EIS/EIR ignores foreseeable natural events such as drought or the cumulative impacts attributed to other geothermal projects that should be considered if water availability becomes a problem. AG.28

In mitigation measure 4.3.2a, the applicant provides for "appropriate changes to operational procedures" if the production or injection of geothermal fluids adversely affects water quality. (*Id.* at p. 4-27.) However, it is unclear what would constitute "appropriate changes" and how the altered operational procedures would remedy water quality problems.

The EIS/EIR should provide sufficient information about its proposed mitigation measures to allow the public and decisionmakers to properly assess the measures feasibility and effectiveness.

J. Inadequate Discussion of Applicable Laws, Regulations, and Guidelines

The EIS/EIR fails to adequately identify and discuss the Project's compliance with applicable laws, regulations, and guidelines. The EIS/EIR states that the Project would require a water well use permit, waste discharge report, and storm water discharge construction permit. (EIS/EIR, pp. 1-10, 4-20.) However, the EIS/EIR fails to provide any information about these permits such as a citation to the statutory authority, a schedule for obtaining the permits, the permits' scope, or discharge quantities and constituents governed by these permits. This information would be helpful in assessing the Project's impact on water quality. Also, the EIS/EIR asserts that the Project would be conducted in accordance with applicable regulations, guidelines, and best management practices, including those in the North Coast and Central Valley Water Quality Control Plans, but it does not provide any information to support this conclusory statement. (*Id.* at pp. 4-20, 4-33.) The EIS/EIR does not say what the Project will do to comply. Without this information, it is impossible to determine whether the Project will comply. AG.29

Further, the EIS/EIR does not identify or how laws, guidelines, and regulations would mitigate any impacts to the environment. Hence, it is impossible to evaluate whether compliance with these permits will adequately mitigate the Project's impacts. AG.30

The EIS/EIR also has deferred its environmental impact analysis by failing to ascertain whether the Project would require certain permits. For example, construction of the transmission line across intermittent stream channels may require a Stream and Lake Alteration Permit (Fish & G. Code § 1603) from the California Department of Fish and Game. (*Id.* at p. 4-20.) The Project may also require a section 404 permit from the U.S. Army Corps of Engineers if the transmission line passes through an area that meets the criteria for a jurisdictional wetland. (*Ibid.*) The EIS/EIR identifies the standards and guidelines for Riparian Reserves, but does not indicate if, or how, they are applicable to the Project. (*Id.* at pp. 4-20, 4-31.) Because the EIS/EIR has not yet determined whether these permits are applicable or even if these areas exist, it is impossible for the public and the decisionmakers to evaluate the Project's impacts on these areas. AG.31

In sum, the EIS/EIR provides a laundry list of applicable laws, guidelines, and regulations but does not specifically identify if, or how, they are applicable to the

Project or how the Project will comply with them. Without this information, it is impossible to assess whether compliance will adequately mitigate any impacts.

VI. GEOTHERMAL RESOURCES

A. Depletion of Geothermal Resource

The EIS/EIR's discussion about impacts to the geothermal reservoir's life expectancy is based on speculation and riddled with inconsistencies. As such, there is insufficient basis for its conclusion that there will be no significant impact to the resource.

The EIS/EIR concludes that the Project will result in a 15% reduction in the reservoir's life expectancy, and finds this impact insignificant. (EIS/EIR, p. 4-47.) However, this conclusion is based on speculation about the reservoir's characteristics and recharge sources. (EIS/EIR, p. 4-43.)

The EIS/EIR acknowledges that "[t]here are insufficient data regarding reservoir capacity and recharge processes to fully evaluate how the net loss of geothermal fluids would affect the longevity of the geothermal resource in the local Fourmile Hill area." (EIS/EIR, p. 4-45.) In another section, the EIS/EIR states: "It is probable that if there is significant recharge to the geothermal system it either is drawn laterally in towards the heat source from [deep sources] or descends from depths through fractures in the roof of the geothermal reservoir." (EIS/EIR, p. 3-41 (emphases added).) In other words, if recharge occurs, it comes from above or horizontally. These statements demonstrate that the EIS/EIR's conclusions about the significance of this impact are based on speculative assumptions. AG.32

The speculative nature of the EIS/EIR's analysis, in combination with Dr. Fox's comments about the EIS/EIR's flawed analyses of groundwater recharge and hydrological connections in other areas, cast substantial doubt on the validity of the EIS/EIR's assumptions about impacts to the reservoir. (Ex. A, Comments 9, 10.) The EIS/EIR does not contain enough information to support its conclusions.

According to the EIS/EIR, the net loss of fluids to the reservoir (withdrawal less injection) will be 475,000 pounds per hour. (EIS/EIR, p. 4-44.) This equates to 187.2 billion pounds over the Project's 45-year operation phase. This is a substantial depletion, and does not even include the proposed CalEnergy project. The EIS/EIR should be revised to include a more thorough assessment of this

impact, which certainly seems significant. As explained above, a lead agency must use its best efforts to discover and disclose all it reasonably can about a project's potential impacts. Under the circumstances, additional investigation is warranted.

The EIS/EIR also relies on the renewability of the geothermal resource to conclude that there will be no short-term use at the expense of long-term productivity (§ 4.20, pp. 4-335-337) or significant irreversible environmental changes (§ 4.21, p. 4-337). These conclusions are questionable without a proper assessment of the Project's impact on the geothermal reservoir. AG.33

VII. CULTURAL RESOURCES

The analysis of Cultural Resources is inadequate because the EIS/EIR fails to provide adequate information regarding these resources. The Project area contains extensive archeological and historic resources. For example, a total of 91 cultural sites have been previously recorded within 0.25 miles of the transmission line segments. (EIS/EIR, p. 3-50.) Eight of these sites have been evaluated under the National Historic Preservation Act and are eligible for the National Register of Historic Places. (*Ibid.*) In addition, a "highly complex temporary camp" located along transmission line segment C1, which is both a prehistoric and historic site, is eligible for the NRHP "based on its prehistoric components." (*Id.* at p. 3-53.) Transmission line segments A2, B1, and C1 may be located adjacent to, or even cross prehistoric quarry zones. (*Ibid.*) Nonetheless, the EIS/EIR claims the Project's impact on cultural resources will be mitigated to insignificance. (EIS/EIR, Table S-5, p. S-14.) The EIS/EIR, however, fails to provide sufficient information regarding cultural resources and to adequately define measures that will mitigate the Project's impacts. AG.34

A. Insufficient Information Regarding Cultural Resources

A project may be deemed to have a significant impact on the environment if it disrupts or adversely affects a prehistoric or historic site or property of historic or cultural significance to a community or ethnic group. (CEQA Guidelines, App. G(j); 40 C.F.R. § 1508(9) (loss or destruction of cultural or historic resources).) The EIS/EIR acknowledges that destruction or "unauthorized collection of a significant unrecorded cultural resource would be considered a significant impact." (EIS/EIR, p. 4-54.) The EIS/EIR, however, fails to provide sufficient information about cultural resources to evaluate this impact. The EIS/EIR failed to fully evaluate potentially significant prehistoric and historic sites. It also failed to conduct an AG.35

adequate sample survey or to provide information regarding the relative values of the areas surveyed.

For example, recorded areas along the transmission line corridors were not evaluated. The EIS/EIR acknowledges that the areas around the Glass Mountain flow and the Medicine Lake Highlands have not been thoroughly inventoried and remain poorly documented. (*Id.* at p. 3-53.) The transmission line segments may cross areas where four poorly documented prehistoric quarry zones are located. (*Ibid.*) Segment C1 crosses lithic scatters, but the EIS/EIR does not indicate whether these areas have been evaluated.

Also, the EIS/EIR did not evaluate areas in the wellfield and power plant site. For example, a prehistoric quarry was identified in that location, but has not been evaluated. (*Id.* at p. 3-51.) The area may also contain a portion of the Long Bell Railroad system, but the EIS/EIR determined that the site did not have sufficient integrity to make it worth a formal evaluation. (*Id.* at p. 3-53.) It seems that a preliminary assessment should have been conducted before making this determination.

Even the EIS/EIR's methodology is inadequate. Based on the sample survey and record search data, the EIS/EIR estimates the number of sites along the transmission line segments and finds that transmission line segments A and B have much lower densities of cultural resources than the C segments. (*Id.* at p. 4-53, Table 4.5-1, p. 4-54.) This estimate does not provide any information about the sites' relative content and value. (Comments of Thomas Reid Associates, Ex. B, § 4.5.) Hence, it is impossible to determine which sites are more valuable and should be avoided. A more comprehensive survey should be completed so that the lead agency can evaluate and select the transmission line segments that would avoid valuable prehistoric and historic sites. (*Ibid.*) AG.36

As the comments of Thomas Reid Associates indicate, the lead agency should have required a comprehensive survey of the entire power plant area. (*Ibid.*) Because this site has been fixed geographically, unlike the transmission line segments, there is no reason why the EIS/EIR did not conduct a detailed survey rather than a sample survey sampling this area. Hence, the lead agency should fully evaluate this area.

Also, all instruments for the occupancy and use of forest lands must be consistent with the forest plans. (16 USC § 1604(i); 36 CFR 219.10(e).) The AG.37

EIS/EIR does not discuss the Project's consistency with the Modoc National Forest Land Resource Management Plan's Cultural Resources Guideline 6, which calls for the protection of cultural resources largely by directing activities away from sensitive areas. The lead agency should evaluate the Project's consistency with this Guideline.

The lead agency must fully evaluate these areas before it can find that the Project will not have a significant impact on cultural resources. Without this information, the public and the decisionmakers cannot make an informed evaluation about the Project's impacts and whether the impacts can and will be mitigated.

B. Inadequate Mitigation Measures

The EIS/EIR fails as an informational document because it proposes vague and inadequate mitigation measures to alleviate the Project's impacts to cultural resources. In the absence of specific mitigation measures, neither the public nor the decisionmakers have any basis for determining whether significant impacts have been mitigated.

The EIS/EIR proposes mitigation to ensure that construction activities do not impinge on protected cultural resources. Mitigation measure 4.5.1c states that sensitive areas shall be intermittently monitored to ensure that sites are protected and avoided during construction. (EIS/EIR, p. 4-55.) First, it is unclear what constitutes a "sensitive area." This term should be defined. Second, it is unclear how often monitoring will be conducted. "Intermittent" is too vague to be provide any information as to whether the monitoring will be adequate. "Intermittent monitoring" should be defined and the lead agency should provide a monitoring schedule. AG.38

The EIS/EIR also proposes mitigation to protect cultural resources at the power plant site. Mitigation measure 4.5.1c recommends that the historic site in this area not be evaluated, "provided that the proponent's use of USFS Road 44N64 remains ordinary." (*Id.* at p. 4-56.) Because "ordinary use" is not defined, it is unclear what uses would not be ordinary and would trigger evaluation. Also, the mitigation measure does not state how an evaluation of the site would mitigate the Project's impacts. AG.39

Further, it appears that the proponent's use would be far from ordinary. Forest Road 44N64, which would provide the primary access road to the power plant and wellfield area, currently has a traffic volume of 10 to 20 trips per day. (*Id.* at pp. 3-171, 4-212.) During construction and decommissioning, the EIS/EIR estimates that over 200 trips per day would be conducted on Forest Road 44N64. (*Id.* at p. 4-212.) In fact, because the road cannot safely accommodate this traffic volume, the Project would have a significant impact on traffic conditions on the road. (*Ibid.*) Thus, because it is already apparent that the Project's use of Forest Road 44N64 would not be ordinary, the historic site should be evaluated and mitigation measures should be proposed that would reduce the Project's impacts on the site.

As the letter from Thomas Reid Associates indicates, mitigation measure 4.5.1a is impractical and infeasible. (*Id.* at p. 4-55; Ex. B, § 4.5.) This measure calls for the evaluation of sites that cannot be avoided. Because the evaluation process is so lengthy and expensive, the mitigation measure would delay the project indefinitely. A more feasible mitigation measure is to avoid the sites by surveying the alternative transmission line routes "so that avoidance can be factored into the selection and design of a preferred route." (Ex. B, § 4.5.) AG.40

Absent adequate and clearly defined mitigation measures, the lead agency has no basis for concluding that the Project will not have a significant impact on cultural resources.

C. Improper Deferral of Mitigation Measures

The EIS/EIR also improperly postpones development of mitigation measures. (*Sundstrom*, 202 Cal.App.3d at pp. 306-08; *Oro Fino Gold Mining Corp. v. County of El Dorado* (1990) 225 Cal.App.3d 872, 885.) Without a reasonably complete discussion of possible mitigation measures, neither the decisionmakers nor the public can properly evaluate the severity of adverse environmental effects or the adequacy of mitigation. (*Robertson*, 490 U.S. at pp. 351-52.) AG.41

Deferred mitigation also violates CEQA's express mandate regarding mitigation of archaeological resources impacts. California Pub. Res. Code § 21083.2 establishes standards for determining whether a project may have a significant impact on archaeological resources, and prescribes specific methods for mitigating such impacts. (*See also* CEQA Guidelines, App. K.) Section 21083.2 indicates that

plans for mitigation of impacts to known archaeological sites must be developed before the project is approved.

The EIS/EIR acknowledges that Project activities along transmission line segment C may require mitigation measures. (EIS/EIR, p. 4-53.) Nonetheless, the EIS/EIR states that potential mitigation along the transmission lines will be determined by an archeologist or cultural resource specialist and could include data recovery. (*Id.* at p. 4-54.) Specifically, mitigation measure 4.5.1a provides for surveys after the Project has been approved. (*Id.* at p. 4-55; Ex. B, § 4.5.) These surveys, however, are necessary to an understanding of the Project's impacts and potential mitigation. Thus, they should have been conducted prior to EIS/EIR's preparation and discussed in the EIS/EIR.

Without surveys and more information regarding the surveys and purported mitigation measures, the public and decisionmakers cannot evaluate the measures' utility in mitigating the Project's impacts. Additionally, without surveys, the lead agency cannot determine alternative routes that may avoid impacts to cultural resources. Absent this information and adequate mitigation measures, the lead agency does not have a sufficient basis to find that the Project would have an insignificant impact on cultural resources.

VIII. TRADITIONAL CULTURAL VALUES

There is no question that the Project will have a tremendous impact on Native American cultural values. The EIS/EIR admits that the Project would have a significant impact on these values even after mitigation measures are implemented. In particular, the Project would have significant unavoidable effects on the Medicine Lake Highlands area, traditional religious practices, landscape views, and socioeconomics. (EIS/EIR, Table S-5, pp. S-14 to S-15.) The Project's noise impacts on traditional sites and uses also would be unavoidable. (EIS/EIR, Table S-5, p. S-14.) AG.42

The EIS/EIR attempts to reduce the Project's significant unavoidable impacts on cultural resources and proposes mitigation to reduce other certain impacts to of concern to Native American tribal members. As discussed below, however, the proposed mitigation measures are insufficient to achieve these goals, but they can be improved. The letter of Thomas Reid Associates provides additional comments. (Ex. B, § 4.6.)

A. Inadequate Mitigation of Impacts to Natural Resources and Other Resources That Affect Traditional Cultural Values

The Native American tribal members have expressed concern about the Project's effects on natural resources (water quality, vegetation, and wildlife), and archaeological and historic resources. (EIS/EIR, p. 4-75.) The EIS/EIR claims that the Project's effects on these resources would be insignificant after implementation of the proposed mitigation measures. (EIS/EIR, Table S-5, p. S-14, p. 4-77.) The EIS/EIR refers to mitigation measures discussed "under the appropriate section" in the EIS/EIR (*e.g.*, hydrology, vegetation, etc.). (*Id.* at p. 4-77.) Similarly, these Comments discuss the inadequacies of the EIS/EIR's mitigation measures in the appropriate sections. AG.43

B. Failure of Mitigation Measures to Adequately Reduce Significant Impacts on Traditional Cultural Values

Although certain impacts would be significant and unavoidable even after mitigation measures have been implemented, the EIS/EIR attempts to reduce these impacts. These proposed mitigation measures, however, can be improved. For example, the EIS/EIR proposes mitigation measure 4.6.3a to reduce noise impacts on traditional sites and uses. (EIS/EIR, p. 4-69.) This measure, however, places the burden on Native American tribal members to contact Calpine to determine activity schedules. (*Ibid.*) It is not appropriate to impose mitigation duties on innocent third parties. Calpine must implement this mitigation measure by apprising tribal members of its activities. Additionally, Calpine should secure a calendar of Native American activities (if one is available) and implement mitigation measures during those activities. Also, mitigation measure 4.6.3b proposes a monitoring program to determine project-related noise levels, but does not provide any information as to what will be done with the results or how excessive noise may be mitigated. (*Ibid.*) AG.44

The applicant has expressed a willingness to consider tribal members for Project-related employment and, accordingly, mitigation measure 4.6.7a requires Calpine to make a "specific outreach" to local tribes for hiring. (*Id.* at p. 4-77.) This measure is inadequate, however, because it is unclear what constitutes a "specific outreach." The mitigation measure should outline a specific outreach plan and identify hiring goals.

The EIS/EIR should discuss measures that will reduce the Project's impacts on traditional cultural values, even though the impacts cannot be reduced to insignificance.

C. Inadequate Analysis of the Significance of the Impact Associated with Amending Klamath National Forest LRMP Standard 24-25

The EIR acknowledges that the Project would conflict with Klamath National Forest Land Resource Management Plan (LRMP) Standard 24-25 and that such conflict could be considered a significant impact under CEQA. (CEQA Guidelines, App. G(a); *see also* 40 C.F.R. § 1502.16(c) (EIS should include discussion of possible conflict with land use plans, policies and controls).) The EIS/EIR proposes amending the Standard to avoid any such inconsistency with Standard 24-25. Such an amendment, however, would still constitute a significant impact under CEQA because it would conflict with the established religious uses of the area. (CEQA Guidelines, App. G(w).) Accordingly, the lead agency should identify the Project's impact on Native American rights and practices as significant.

The Pit River Bands and Klamath/Modoc peoples have used the Medicine Lake Highlands and Timber Mountain areas since prehistoric times. (EIS/EIR, p. 3-63.) These culturally sensitive traditional use areas are important for hunting and gathering, mineral/rock resources, social interaction, spiritual activities, religious ceremonies, and medicinal purposes. (*Ibid.*) The "traditional activities in these areas remain significant and integral to the practices and beliefs of the tribal peoples of the area" and the physical features remain culturally significant. (*Id.* at p. 3-65.) The Medicine Lake Highlands and Timber Mountain areas are "tangible properties" that are viewed by the tribal peoples as "integrated parts of a whole landscape." Thus, the cultural resource is viewed holistically and cannot easily be separated into discrete neatly bounded sites. (*Id.* at p. 3-66.)

The Native American tribes have expressed concern that the Project will limit their ability to practice their spiritual and traditional cultural activities in the area. (*Id.* at p. 3-67.) For example, the Project may alter the area's characteristics so drastically, through impacts to views, wildlife, noise, vegetation, and other resources, that the tribal peoples may choose not to practice spiritual activities there. (*Ibid.*)

AG.45

According to the CEQA Guidelines, a project may have a significant effect on the environment if it will "[c]onflict with adopted environmental plans and goals of the community where it is located" (CEQA Guidelines, App. G(a)); "[d]isrupt or adversely affect . . . property . . . of cultural significance to a community or ethnic or social group . . ." (App. G(j)); or "[c]onflict with established . . . religious . . . uses of the area" (App. G(w)). (*See also* CEQA Guidelines § 15131(b) (noting that disturbance of religious practices from noise may be a significant environmental impact).) Klamath National Forest LRMP Standard 24-25 provides:

> Protect traditional Native American rights and practices (Public Law (PL) 95-341) to insure the integrity of the site and to assure that use will continue to occur and will not be impaired.

The EIS/EIR admits that Project may conflict with this goal. (*Id.* at p. 4-78.) Specifically, the EIS/EIR admits that the Project "could conflict with established religious use of the Medicine Lake Highlands and would introduce visual and audible elements that are out of character with the area." (*Id.* at p. 4-64.) Local tribal members believe the proposed Project will conflict with their religious use of the area and will have a significant adverse effect on their religious and spiritual use of the region. (*Id.* at p. 4-65.) Additionally, "[i]f tribal members choose to discontinue use of sites, or if the project noise or visible elements impaired use of sites, the proposed project would be inconsistent with the current Klamath LRMP standard 24-25, as written." (*Id.* at p. 4-78.) Accordingly, this conflict constitutes a significant impact on the environment and should be acknowledged as such.

The EIS/EIR proposes to amend Standard 24-25 to remove any inconsistencies that would be considered significant under CEQA. The amendment would reflect protections afforded under American Indian Religious Freedom Act (42 U.S.C. § 1996). (EIS/EIR, p. 4-78.) The EIS/EIR claims that Standard 24-25 is unenforceable because the continued use of traditional sites cannot be assured. (*Ibid.*) The EIS/EIR also appears to argue that Standard 24-25 provides more rights than allowed under AIRFA, and thus, Standard 24-25 "was written in error." (*Ibid.*) According to the EIS/EIR, the Klamath National Forest will consider whether to amend the LRMP. (*Ibid.*)

The EIS/EIR acknowledges that the amendment may be significant under CEQA because "it could result in a conflict with an established religious use of an area . . . ." (*Id.* at p. 4-79; CEQA Guidelines, App. G(w).) The EIS/EIR admits that

any amendment to Standard 24-25 would be considered a significant impact under CEQA. (EIS/EIR, p. 4-79.)

However, the EIS/EIR states that the amendment is not significant under NEPA. (*Ibid.*) The EIS/EIR provides no support for this assertion. (*Ibid.*) The amendment will affect not only the Project area, but entire Klamath National Forest. The lead agency should fully analyze the effect of the proposed amendment and provide support for its final determination regarding the amendment's significance. At the very least, the lead agency will be required to comply with certain NEPA procedures even if the amendment is deemed insignificant. (36 C.F.R. 219.10(f); Forest Service Handbook: Land and Resources Management Planning Handbook, FSH 1909.12, ch. 5.4.) These procedures should be discussed so the public and decisionmakers have a complete understanding of the amendment process and impacts. Without this information, the lead agency has no basis for its determination that amending the Klamath National Forest LRMP is insignificant. Hence, the Project should be identified as having a significant impact on traditional cultural values and appropriate measures should be proposed to mitigate this impact.

IX. VEGETATION

An EIS/EIR must contain a sufficient degree of analysis to provide the decision-makers with information that "enables them to make a decision which intelligently takes account of environmental consequences." (CEQA Guidelines § 15151; *Adler*, 675 F.2d at p. 1085; *Sierra Club*, 701 F.2d at p. 1029.) The EIS/EIR must contain facts and analysis, not just bare conclusions or opinions. (*Concerned Citizens*, 42 Cal.3d at p. 935; *Seattle Audubon*, 798 F.Supp. at p. 1473.) The EIS/EIR fails to provide sufficient information regarding vegetative resources and improperly defers its assessment of the Project's impacts on these resources. It also does not provide an adequate description of mitigation measures. Without this information, the lead agency has no basis for finding that the Project would not substantially affect an endangered, rare, or threatened species of plant or its habitat, or diminish habitat for plants. (CEQA Guidelines, App. G(c), (t).) Further, the EIS/EIR must identify all significant impacts and consider mitigation measures. The EIS/EIR overlooks significant impacts on vegetation and it must be revised and recirculated. AG.46

A. Insufficient Information Regarding Vegetation

The EIS/EIR fails as an informational document because it does not provide sufficient information about the Project's impacts on vegetation. One flaw is that the EIS/EIR does not contain a complete list of the species ranging in the Project area. For example, the Trinity buckwheat (*Erigonum alpinum*), which is a state endangered species and a federal species of concern, should have been discussed. (Ex. B, § 4.7; Ex. F (7/3/96 letter from Joel Medlin, U.S. Fish & Wildlife Service).) Additionally, Ashland's thistle, McDonald's rockcress, Yreka phlox, slender orcutt grass, and the Siskiyou marioposa lily are listed species in that exist in Siskiyou County. (*Ibid.*) AG.47

Another flaw is that the EIS/EIR states that the false truffle, which is a special-status fungus, is likely to be found in the Project area. (EIS/EIR, p. 4-94.) Despite acknowledging that the Project will affect the truffle and other fungus and lichen species, the EIS/EIR concludes that the impacts will not be significant. (*Ibid.*) The EIS/EIR, however, fails to provide any scientific or factual data supporting its conclusion. (Ex. B, § 4.7.) AG.48

Without any supporting data, the EIS/EIR states that the effect of well venting on vegetation would be "adverse but not significant." (EIS/EIR, p. 4-89.) It is clear that this conclusion is not based on factual data because the EIS/EIR later proposes to develop a monitoring plan to "evaluate and confirm the insignificant depositional impacts to vegetation" in mitigation measure 4.7.2a. (*Id.* at p. 4-92.) (Ex. B, § 4.7.) Absent this information, there is insufficient evidence to support the lead agency's conclusion that the impacts of well venting are insignificant. AG.49

The EIS/EIR states that the removal of lodgepole pine in a meadow would not affect meadow habitat. (EIS/EIR, p. 4-94.) Construction of transmission line segment A1 would affect approximately 1.4 acres of meadow and lodgepole pine habitat. (*Ibid.*) The EIS/EIR appears to compare the removal of lodgepole pine to losses from natural causes such as disease, fire, and fluctuations in groundwater. (*Id.* at p. 4-95.) The EIS/EIR fails to provide any factual basis for its assertion that pine removal would not affect meadow habitat and it fails to recognize that the Project's impacts cannot be characterized as being similar to natural losses. Rather, the Project will cause losses *in addition to* any natural losses. Thus, the EIS/EIR's analysis of the Project's impacts on the meadow and lodgepole pine habitat lacks any factual foundation. AG.50

The EIS/EIR also fails to provide sufficient information regarding the introduction of exotic pest plants (weeds) into the environment. Weeds, which present a threat to native ecology because they displace native plants, could be introduced into the area by the Project's vehicles. (*Id.* at p. 4-96; Ex. B, § 4.7.) Thomas Reid Associates comments on this issue and recommends mitigation. (Ex. B, § 4.7.) AG.51

All instruments for the occupancy and use of forest lands must be consistent with the forest plans. (16 USC § 1604(i); 36 CFR 219.10(e).) The EIS/EIR does not discuss the Project's consistency with the Modoc National Forest Land Resource Management Plan's (LRMP) Sensitive Plants Guideline 6, which calls for the management and conservation of sensitive plant species and habitat. Also , the Klamath National Forest LRMP's Guidelines 7-1 and 7-4 for Sensitive Plants provide that that the Forest Service should enhance sensitive plant species populations and habitat and avoid disturbances during critical growth periods. The lead agency should evaluate the Project's consistency with these forest plans. AG.52 AG.53

Without this information, the public and the decisionmakers cannot assess the Project's impacts on vegetation and propose appropriate mitigation measures.

B. Inadequate Discussion of Mitigation Measures

The EIS/EIR fails as an informational document because it does not contain an adequate discussion of mitigation measures. (*Robertson*, 490 U.S. at pp. 351-52; *Oro Fino*, 225 Cal.App.3d at p. 885.) One flaw is that the EIS/EIR contains incompatible mitigation measures. Mitigation measure 4.7.1d prescribes replanting transmission line rights-of-way with native species such as ceanothus, manzanita, and bitter brush. (EIS/EIR, p. 4-89.) However, these plant species are highly flammable. (Ex. B, § 4.7.) Accordingly, this mitigation measure appears to be incompatible with the fire control requirements defined in measure 4.15.5g. (EIS/EIR, p. 5-41.) AG.54

Another flaw is that mitigation measure 4.7.4b is internally inconsistent. (Ex. B, § 4.7.) The measure first states that sensitive plant communities in potential wetland areas along transmission line segment C1 shall be avoided. (EIS/EIR, p. 5-16.) However, the measure also states that "construction activities shall be timed to avoid wet periods in which habitat disturbance may be greater." (*Ibid.*) It is AG.55

unclear whether the mitigation measure recommends avoiding these potential wetlands completely or only during wet periods.

The letter from Thomas Reid Associates addresses additional instances where the EIS/EIR's discussion of mitigation measures is inadequate. (Ex. B, § 4.7.) Also, standards for retention of dead and down woody debris and snags should be discussed. (Ex. D.) Revegetation should be considered successful when there is eighty percent coverage within five years. (Ex. E.) Without more information regarding mitigation, there is no basis for the lead agency to conclude that the Project's impacts on vegetation would be mitigated to insignificance. AG.56 AG.57 AG.58

C. Improper Deferral of Environmental Impact Assessment

The EIS/EIR improperly postpones assessment of the Project's impacts on vegetation. The EIS/EIR repeatedly proposes mitigation measures that require monitoring during Project implementation to assess impacts on vegetation. This impact assessment should be part of the EIS/EIR process so that any significant impacts can be evaluated, and mitigation or alternatives proposed that would reduce the Project's effects on vegetation. Deferral of this assessment violates CEQA's and NEPA's requirements that environmental review occur at the earliest feasible stage in the planning process and prior to project approval. (*Sundstrom*, 202 Cal.App.3d at pp. 306-08; *Seattle Audubon*, 798 F.Supp. at p. 1482.) AG.59

Mitigation measure 4.7.2a recommends that the applicant "develop and implement a monitoring plan" to assess the depositional effects on vegetation. (EIS/EIR, p. 4-92.) Boron can cause plant stress and damage. (*Id.* at p. 4-91.) Further, as discussed below, according to the comments of Dr. Fox, boron will have a significant impact on vegetation. (Ex. A, comment 13.) Without accurate information about depositional effects, the public and decisionmakers are precluded from evaluating the adequacy of the monitoring plan, resulting data, and potential mitigation. AG.60

Mitigation measure 4.7.3a requires floristic surveys of the transmission line route, and wellfield and power plant areas. (*Id.* at p. 5-15.) Populations of special status species are to be marked and avoided. (*Ibid.*) These surveys should have been completed as part of the impact assessment process. Without these survey results, the public and the decisionmakers cannot properly assess the significant of the Project's impacts and determine whether mitigation measures are necessary. AG.61

Further, the measure does not indicate what will happen if the populations cannot be avoided. (Ex. B, § 4.7.)

Also, mitigation measure 4.7.4b proposes delineating the extent of potential wetlands prior to construction and siting the transmission line facilities to avoid these areas. (EIS/EIR, p. 5-16; *see also* Ex. B, § 4.7.) This delineation should have been completed as part of the impact assessment. (Ex.F (July 3, 1996 letter from Joel Medlin, U.S. Fish & Wildlife Service).) Additionally, the impacts associated with this mitigation measure are not discussed. For example, if the transmission line facilities are moved, then the impacts on the new location should be discussed such as effects on sensitive plant communities, cultural sites, wildlife habitat, vegetation loss, and views. (*See, e.g.*, EIS/EIR, Table 2.4-1, pp. 2-67 to 68.) Without this information, the public and decisionmakers are precluded from assessing the presence and extent of any wetlands. AG.62 AG.63

Similarly, the EIS/EIR states that a meadow area along transmission line segment A1 *may* meet wetlands criteria. (*Id.* at p. 4-94.) This assessment should have been completed by this stage of the environmental review process. Without information about potential wetlands, the Project's impacts on these areas cannot be assessed. AG.64

By postponing environmental impact assessment, the EIS/EIR deprives the public and the decisionmakers of the opportunity for meaningful review of the Project's impacts and to propose mitigation measures. AG.65

D. Failure to Recognize Significant Impacts on Vegetation from Deposition of Toxic Metals

The EIS/EIR fails to identify toxic metal deposition as significantly affecting local vegetation. (EIS/EIR, p. 4-92.) Dr. Phyllis Fox's comments demonstrate that the EIS/EIR's analysis of boron deposition is misleading and incorrect. (Ex. A, comment 13.) Boron deposition will cause a significant adverse effect to vegetation. Similarly, air emissions from the Project will cause deposits of fluorine, bromine, lithium, strontium, and barium on vegetation. These other metal deposits would also cause significant impacts that must be mitigated. AG.66

The EIS/EIR should be revised to reflect the Project's impact on vegetation from toxic metal emissions and the lead agency should propose mitigation measures. AG.67

X. WILDLIFE

The EIS/EIR lacks scientific and factual data, meaningful analysis, and adequate mitigation measures to support its conclusion that the Project will not have a significant impact on wildlife. Without this information, the lead agency does not have sufficient evidence to conclude that the Project will not substantially affect an endangered, rare, or threatened species or its habitat, interfere with the movement of any resident or migratory species, or diminish habitat for wildlife. (Guidelines, App. G(c), (d), (t).) AG.68

A. Insufficient Information About Wildlife Species in the Project Area

The EIS/EIR fails as an informational document because it does not provide sufficient information about wildlife species in the area. For example, the EIS/EIR does not contain a complete list of the animal and plant species ranging in the Project area. The California wolverine and Sierra Nevada red fox are listed species that exist in Siskiyou County and whose range overlaps with the Project area. [Ex. B, § 4.8; Ex. B, Attachment; *see also* Ex. F, pp. 4-8.) The golden eagle is a fully protected species in the area. (Ex. B, § 4.8.) The lead agency should describe these animals and their habitat requirements. The lead agency should also conduct surveys if the Project has the potential to affect these species. (Ex. B, § 4.8.) This information is necessary to assure the public and the decisionmakers that the Project's impacts on these species have been considered. However, none of this information has been provided in the EIS/EIR. AG.69 AG.70

The EIS/EIR is inconsistent in its assessment of wetlands or riparian areas and associated wildlife. The EIS/EIR implies that there are no wetland or riparian areas that would be affected by the Project. For example, in the regional overview, the EIS/EIR states that there is "little surface water, few permanent streams or riparian habitats, and few springs, meadows, or wetlands" and that amphibian species richness is low. (EIS/EIR, p. 3-99.) However, the EIS/EIR also refers to Riparian Reserves delineated by the USFWS and to potential wetlands along transmission line segment A1. (EIS/EIR, Mitigation Measure 4.3.5a, p. 5-6, p. 4-94.) Thus it is unclear whether the Project will affect wetland or riparian areas and associated wildlife species. The EIS/EIR should provide a discussion of these areas so that the public and decisionmakers can ensure that all of the Project's impacts on wildlife have been evaluated. AG.71

B. Insufficient Information Regarding the Project's Impacts On Wildlife

The EIR/EIS fails to provide sufficient information to support its conclusions about the Project's effect on wildlife species. The EIS/EIR repeatedly states that the Project's impacts on various species are insignificant because the associated habitat losses constitute only a small portion of the overall habitat.[5] The EIS/EIR, however, does not provide adequate data about the habitat types to support this conclusion, as required by CEQA and NEPA. (*See Concerned Citizens*, 42 Cal.3d at p. 935; *Seattle Audubon*, 798 F.Supp. at p. 1479.) For example, Figure 3.7-1 does not show the continuation of the habitat types into the areas adjacent to the Project site. (Ex. B, § 4.8.) Also, the EIS/EIR does not indicate the relative value of habitat types areas, such as the red fir forest, to wildlife species. Thomas Reid Associates discusses this issue in more detail. (Ex. B, § 4.8.) Thus, the EIS/EIR does not provide the necessary scientific or factual data to support its determination that habitat losses are insignificant. AG.72

The EIS/EIR should provide more detailed data regarding these species' overall population and distribution, including species range maps. (Ex. B, § 4.8.) Absent such data, and in light of the available information, there is insufficient evidence to conclude that that Project will not significantly affect these species.

The California Department of Fish and Game had recommended a thorough analysis of the impacts from the creation of year-round access to the area, but the EIS/EIR fails to provide sufficient information regarding the impact of new roads on wildlife. (Ex. G, p. 2, July 9, 1996 Letter from Richard Elliot, Cal. Dept. of Fish & Game; Ex. B, § 4.8.) The EIS/EIR acknowledges that "new roads associated with the transmission line could provide the public with access to portions of the project area that were previously inaccessible." (EIS/EIR, p. 4-109.) Nonetheless, the EIS/EIR find this impact to be insignificant because any disturbance of wildlife would be "temporary and sporadic." (*Ibid.*) AG.73

Again, the EIS/EIR fails to provide any factual basis supporting its conclusion. In fact, it is likely that new roads will increase the Project's impacts by

[5] For example, the EIS/EIR reaches this conclusion about the hairy woodpecker (pp. 3-105, 4-116.), loggerhead shrike (pp. 3-105, 4-116.), pileated woodpecker (pp. 3-107, 4-118), mule deer (p. 4-120), American badger (p. 4-120), American marten (p. 4-120), Oregon snowshoe hare (p. 4-120), and the pronghorn (pp. 4-120 to 4-121).

opening previously inaccessible areas to the public. The EIS/EIR should discuss where the new roads will be located, what areas will be newly accessible, the types of public activities allowed, and the effects of increased access on wildlife. (Ex. B, § 4.8.) Mitigation measures may be required to reduce the associated impacts. These measures may include gating the new roads or closing them to the public. (Ex. B, § 4.8.)

All instruments for the occupancy and use of forest lands must be consistent with the forest plans. (16 USC § 1604(i); 36 CFR 219.10(e).) The EIS/EIR also does not identify whether sensitive species such as the bald eagle, Swainson's hawk, goshawk, osprey and mule deer are within designated habitat as defined by the Modoc National Forest LRMP and would be subject to the standards and guidelines therein. (Modoc National Forest LRMP, pp. 4-25 to 4-29.) Also, the Klamath National Forest LRMP requires the Forest Service to avoid or minimize impacts to sensitive species where possible. (Klamath National Forest LRMP Standard 8-18.) The Project's consistency with these forest plans should be discussed. AG.74 AG.75

The EIS/EIR also fails to adequately assess noise impacts, impacts from the sumps on birds or the many impacts associated with the transmission line corridor. These impacts are discussed in more detail in the letter from Thomas Reid Associates and in the comments of Dr. Fox. (Ex. B, § 4.8; Ex. A, Comments 18, 19.) AG.76

Without this information, the public and decisionmakers cannot fully evaluate the Project's impacts on wildlife or evaluate mitigation measures.

C. Failure to Identify Significant Impacts on Sensitive Species

The EIS/EIR's determination that the Project will not have a significant impact on wildlife species is impermissibly based on unsupported assumptions and conclusions, and conflicts with information in the EIS/EIR itself. (*See Concerned Citizens*, 42 Cal.3d at p. 935; *Seattle Audubon*, 798 F.Supp. at p. 1482.) Absent adequate scientific and factual data, there is no basis for concluding that there are no significant impacts on wildlife. AG.77

1. Bald Eagle

The EIS/EIR states that the bald eagle (*Haliaeetus leucocephalus*) has been observed in the Project's vicinity in both summer and winter. (EIS/EIR, p. 3-101.) The bald eagle is listed as a federally threatened and California endangered species. AG.78

(*Ibid.*) Bald eagle activity occurs on the south side of Medicine Lake, about 3.5 miles southeast of the wellfield and power plant. Bald eagles have been observed at Modoc Lake, about 1.3 miles to the east. (*Ibid.*) Additionally, bald eagles have been observed along transmission line segment A1 and three winter roosting sites are located in the vicinity. (*Ibid.*) The EIS/EIR acknowledges that bald eagles are among the species most likely to be affected by collisions with transmission lines. (*Id.* at p. 4-125.)

Nonetheless, the EIS/EIR finds that the Project will not significantly affect the bald eagle because no foraging or nesting habitat would be lost. (*Id.* at p. 4-114.) Additionally, the EIS/EIR presumes that noise, human disturbance, and construction impacts would not adversely or significantly affect the bald eagle. (*Ibid.*) The EIS/EIR, however, offers no basis for its conclusions. There is no discussion of the Project's effects on the winter roosting sites. Indeed, the EIS/EIR's conclusions are inconsistent with the EIS/EIR's own information regarding the bald eagle's use of the Project area.

The EIS/EIR does not discuss the Project's consistency with the U.S. Fish & Wildlife Service's *Pacific Bald Eagle Recovery Plan* (1986), portions of which are attached as Exhibit H. (CEQA Guidelines, App. G(a) (consistency); (43 USC § 1712(c)(9) (requiring coordination with federal, state, and local land use planning and management programs).) The Klamath National Forest LRMP Standard 8-7 requires bald eagle management according to the *Recovery Plan*. The *Recovery Plan* specifies goals such as maintaining and improving forested habitat in both the breeding and wintering range. (*Recovery Plan*, § 1.32) This may be accomplished through prohibiting logging of known nest trees, perch trees, and winter roost trees, and through preserving snags. (*Id.* at §§ 1.3211, 1.3215.) Further, the *Recovery Plan* restricts power line construction within 1 mile of communal roosts and requires corrective measures "where repeated collisions (more than 1) are documented." (*Id.* at § 4.132.) The EIS/EIR should evaluate whether the Project is consistent with these measures and others identified in the *Recovery Plan*.

Absent this information, there is no basis for concluding that the Project will not have a significant impact on the bald eagle.

2. Northern Goshawk

The Northern goshawk (*Accipiter gentilis*) is a federal and state species of concern and a USFS sensitive species. (EIS/EIR, p. 3-105.) The EIS/EIR AG.79

acknowledges that there have been widespread sightings of the goshawk in the region and that the goshawk is "resident in the Medicine Lake Highlands." (*Ibid.*) Nesting and foraging sites have been identified throughout the Project area. (*Id. at* pp. 3-105 to 3-106.)

The Project would destroy about 154 acres of foraging habitat. (*Id. at* p. 4-116.) Additionally, the transmission line would affect approximately 27 acres of potential nesting habitat in red fir forest. (*Ibid.*) Goshawks nesting in the west-central portion of the wellfield and power plant area "could be affected by noise and disturbance from construction and well drilling activities" although the well pad locations were moved away from existing nest sites to reduce noise effects. (*Id.* at p. 4-117.) Nonetheless, the EIS/EIR states that noise and disturbance effects on the goshawk will not be significant. (*Id.* at p. 4-121.)

The EIS/EIR, however, fails to provide adequate data or analysis supporting its conclusion. Absent more information, there is no basis to determine that the Project will not significantly affect the goshawk.

3. Northern Spotted Owl

The northern spotted owl (*Strix occidentalis caurina*) is listed as a federal threatened species and a California species of concern. (*Id. at* p. 3-106.) A spotted owl activity center is located 3.5 miles west of the wellfield and power plant area. (*Ibid.*) Possible foraging habitat is scattered throughout the wellfield and power plant area, although its fragmented condition may reduce spotted owl use. (*Ibid.*) Suitable nesting and foraging habitat exists within 0.25 miles of the freshwater pipeline route. (*Ibid.*) Such habitat also traverses, or is adjacent to, certain transmission line segments. (*Id.* at pp. 3-107, 4-117.)

The Project would remove 106.4 acres of late seral forest, which is spotted owl habitat. (EIS/EIR, Table 4.7.1, p. 4-85; Ex. B, § 4.8.) The EIS/EIR notes that construction of the transmission line alone could affect up to 77 acres of potential spotted owl habitat. (EIS/EIR, p. 4-117.) Transmission line maintenance activities also could "potentially result in the disturbance of northern spotted owl in adjacent habitat." (*Id.* at p. 4-121.) AG.80

Nonetheless, the EIS/EIR does not indicate whether the Project will have a significant effect on the northern spotted owl. It fails to identify the consequences of wellfield development on the owl's foraging capabilities. The EIS/EIR should also

consider the "disproportionate impact" that removal of late seral forest will have on the spotted owl. (Ex. B, § 4.8.)

Absent adequate data and a reasoned analysis of the Project's impact on the owl, the EIS/EIR fails as an informational document. Additionally, given the sparse data available, there is no basis to determine that the Project will not significantly affect the owl.

4. Osprey

The osprey (*Pandion haliaetus*), which is a USFS management indicator species and a California species of special concern, forages in the Medicine Lake and Bullseye Lake areas. (EIS/EIR, p. 3-107.) The osprey perches in trees along transmission line segment A1 and one active nest was observed 0.5 miles south of segment A1. Suitable habitat also exists near segment A2. (*Ibid.*) The EIS/EIR acknowledges that the osprey is among the species most likely to be collide with transmission line segment A1. (*Id.* at p. 4-125; Ex. B, § 4.8.) Nonetheless, the EIS/EIR concludes that the Project would not reduce osprey foraging or nesting habitat would be lost and it would not significantly affect the osprey. (EIS/EIR, p. 4-118.)

The available information, however, indicates that transmission line collisions will significantly affect the osprey population and other bird species. The letter from Thomas Reid Associates states the placing 24 miles of transmission line in the area "creates an unavoidable increase in avian mortality, and would be a significant, unmitigable impact." (Ex. B, § 4.8.) Further, proposed mitigation measure 4.8.4a is inadequate to reduce bird collisions because the ball and marker system is ineffective at night or under inclement weather conditions. (EIS/EIR, p. 4-126; Ex. B, § 4.8.) Hence, this impact would not be mitigated to insignificance. AG.81

In sum, the EIS/EIR's finding the Project will not have a significant impact on the osprey is based on unsupported conclusions and not on facts. Given the available information, there is no basis to determine that the Project will not significantly affect the osprey and adequate mitigation measure should be proposed.

5. Migratory Species and Mule Deer

A project may have a significant impact on the environment if it will substantially interfere "with the movement of any resident or migratory fish or AG.82

wildlife species." (CEQA Guidelines, App. G(d).) The EIS/EIR, however, does not provide sufficient information about migratory species to adequately assess the Project's impacts on these species. The EIS/EIR does not even identify whether the wellfield and power plant areas or transmission lines segments are on any migration routes. (Ex. B, § 4.8.) Thomas Reid Associates addresses the Project's interference with migration routes in more detail. (Ex. B, § 4.8.) Without this basic information about migration routes, the EIS/EIR cannot determine whether the Project will affect animal migration.

More specifically, the EIS/EIR does not provide a sufficient analysis of the Project's effects on mule deer migration. A map in the the USDA Forest Service's *Environmental Assessment for Geothermal Leasing* (1981) shows a major mule deer migration corridor that appears to run through the power plant and well pad area. The EIS/EIR, however, concludes that the Project facilities and roads will not interfere with animal migration routes. (EIS/EIR, p. 4-122.)

The EIS/EIR's conclusion is unsupported by any factual data. Accordingly, the EIS/EIR "should describe the effect that 18 to 36 months of construction will have on the migrating deer herd since the herd will be expected to avoid the construction are during this time, or perhaps permanently." (Ex. B, § 4.8.) Without this information, there is no basis to determine that Project will not have a significant impact on the environment. AG.83

Further, the EIS/EIR's proposed mitigation that would reduce the Project's impacts on mule deer is inadequate. Mitigation measure 4.8.3m prohibits construction or decommissioning activities on mule deer winter range between December 1 and March 1. (EIS/EIR, p. 4-125.) However, the critical period for mule deer winter range is from November 1 though May 1. (USDA Forest Service *Environmental Assessment for Geothermal Leasing* (1981); Ex. B, § 4.8.) This mitigation measure should be revised to encompass the critical period for mule deer winter range. (Ex. B, § 4.8.) Without adequate mitigation, there is no basis for the lead agency to conclude that the Project's impacts on migratory species and mule deer have been mitigated to insignificance.

6. Other Sensitive Species

The EIS/EIR repeatedly finds that the Project will not affect sensitive species because Project-related habitat losses constitute only a small portion of the habitat available. The EIS/EIR's analysis fails to recognize that the issue is not the AG.84

Project's percentage contribution to total habitat loss, but whether *any* habitat loss is significant in light of the existing environment. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718.) As the letter from Thomas Reid indicates, the EIS/EIR does not contain information regarding the available habitat types and their relative value. (Ex. B, § 4.8.) It also does not quantify the remaining habitat, so it is impossible to assess whether the habitat losses truly are only a small percentage of the available habitat. Without this information, and particularly the information regarding the relative importance of the lost habitat, the EIS/EIR does not afford any scientific or factual basis for its conclusion that the Project will not significantly affect sensitive species. (*See Concerned Citizens*, 42 Cal.3d at p. 935; *Seattle Audubon*, 798 F.Supp. at p. 1482.) Thus, it fails as an informational document.

For example, the EIS/EIR states that the blue grouse (*Dendrapagus obscurus*), a USFS Management Indicator Species, is likely a year-round resident in the wellfield and power plant areas and along certain transmission line segments. (EIS/EIR, p. 3-104.) The grouse has been observed in the wellfield and power plant areas. (*Ibid.*) Approximately 128 acres of habitat will be lost as a result of the Project. (*Id.* at p. 4-114.) The EIS/EIR, however, finds no significant impact to the blue grouse because the habitat lost is only a small fraction of the total habitat available. (*Ibid.*) AG.85

The Cooper's hawk (*Accipiter cooperii*), a California species of special concern, has been observed in the wellfield and power plant area. (*Id.* at p. 3-104.) Suitable nesting and hunting habitat is present in the wellfield and power plant area and along the pipeline and certain transmission line segments. (*Ibid.*) The Project will cause the loss of approximately 154 acres of suitable habitat. (*Id.* at p. 4-114.) The EIS/EIR finds no significant impact because the habitat lost is only a small fraction of the total habitat available. (*Ibid.*) AG.86

The EIS/EIR makes similar findings for the golden eagle (*Aquila chrysaetos*), despite suitable foraging habitat and observation of a nest site. (*Id.* at pp. 3-104, 4-116.) AG.87

The EIS/EIR must provide scientific and factual data regarding sensitive species' habitat, including its relative value. Without this information, the public and decisionmakers cannot assess the Project's impacts on wildlife and evaluate mitigation measures. AG.88

D. Inadequate Discussion of Mitigation Measures

The EIR/EIS fails to provide an adequate discussion of mitigation measures that would minimize the Project's significant impacts to wildlife. (Cal. Pub. Res. Code §21100(b)(3); 14 CCR § 15126(c); *Robertson*, 490 U.S. at pp. 352-52.) One flaw is that the EIS/EIR does not discuss specific guidelines for mitigating impacts to sensitive species. For example, CDFG has prepared guidelines for mitigating impacts to the Swainson's Hawk. (Ex. B, § 4.8.) The EIS/EIR, however, does not adopt these mitigation measures. This deficiency is addressed in detail in the letter from Thomas Reid Associates. (Ex. B, § 4.8.) AG.89 AG.90

Similarly, the EIS/EIR does not propose measures mitigating the loss of foraging habitat for many of the birds. Thomas Reid Associates recommends mitigation similar to that found in the Swainson's hawk guidelines. (Ex. B, § 4.8.) AG.91

Another flaw is that the proposed mitigation measures are insufficient to reduce the Project's impacts on the environment. For example, mitigation measure 4.8.1, which proposes to reduce habitat loss through vegetation management, is inadequate. (EIS/EIR, p. 4-110.) Measure 4.8.1c states that transmission lines will be located in certain areas "whenever possible." However, the measure does not explain how the impact will be mitigated if it is not possible to relocate the transmission line. (Ex. B, § 4.8.) Without sufficient information about potential mitigation, it is impossible to determine whether the proposed mitigation measure would reduce the Project's impacts to insignificance. (Ex. B, § 4.8.) AG.92

The EIS/EIR also acknowledges that ospreys and bald eagles are likely victims of collisions with the transmission line segments. (EIS/EIR, p. 4-125.) The letter from Thomas Reid Associates indicates that the selection of transmission line segment B1 would reduce this impact. (Ex. B, § 4.8.) This alternative, however, is not included as a mitigation measure. This alternative should be discussed. AG.93

The Modoc National Forest LRMP includes stipulations for the protection of wildlife that may be imposed on projects on a case-by-case basis. (Modoc National Forest LRMP, p. 4-18.) Special Stipulation 5 includes prohibitions on conducting activities at any time near bald eagle winter roosts and nesting habitat, goshawk nesting territories. (*Id.* at p. I-2.) It also prohibits activities during critical periods. (*Ibid.*) This stipulation should be considered as a mitigation measure. AG.94

Absent adequate mitigation measures, there is no basis for the lead agency to determine that the Project's impacts on the environment have been mitigated to insignificance. AG.95

E. The Project Must Comply with the Requirements of the Endangered Species Acts

The EIS/EIR acknowledges that the Project is subject to the federal and state endangered species acts. (EIS/EIR, p. 1-10; 16 U.S.C. § 1536; Cal. Fish & G. Code § 2090.) These acts prohibit the taking of listed species without a permit. (16 U.S.C. § 1538(a)(1)(B); Cal. Fish & G. Code § 2081.) Under federal law, taking a species includes not only direct harm to a species, but also habitat modification that actually injures the species by impairing breeding, feeding, or sheltering. (50 C.F.R. § 17.3; *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon* (1995) ___ U.S. ___, 115 S.Ct. 2407.)

Prior to the issuance of a take permit, the lead agency must undertake a consultation process. (16 U.S.C. § 1536(a)(2); Cal. Fish & G. Code § 2090.) This includes the completion of a biological assessment that identifies any listed species that the proposed action is likely to affect. (16 U.S.C. § 1536(c)(1).)

AG.96

In this case, the Project clearly has the potential to take listed species. (Ex. B, § 4.8.) The EIS/EIR, however, does not evaluate the Project in light of the statutory requirements. For example, it is unclear whether a biological assessment has been completed for the Project. Although the lead agency completed a biological assessment/evaluation during the Project's exploratory phase, it focussed on well pad drilling. (Galea & Oberlag, *Fourmile Hill Geothermal Exploration Project: Biological Evaluation/Assessment* (1996); EIS/EIR, p. 7-11.) Thus, the assessment would require a substantial upgrade to adequately evaluate impacts associated with the current Project. The EIS/EIR does not identify whether the lead agency completed a more comprehensive biological assessment. The EIS/EIR also does not indicate whether the federal or state consultation processes have begun or the results of the consultation processes.

Absent such information, the public and decisionmakers cannot evaluate the Project's impacts on listed species and there is no basis for concluding that impacts will be mitigated or that permits would be issued.

XI. VISUAL QUALITY

The EIS/EIR's analysis of the Project's visual quality impacts is severely flawed. As the analysis of Thomas Reid Associates indicates, the EIS/EIR used an improper methodology for assessing visual impacts. (Ex. B, § 4.9.) This "Key Observation Point" methodology does not provide a sufficient basis for understanding or evaluating the significance of the Project's impacts. (*Ibid.*)

The general approach of the EIS/EIR's visibility analysis is to list all of the ways in which the Project will significantly impact views, and then to dismiss these impacts as insignificant without any credible basis. These conclusions of insignificance leave the reader baffled, because they are in stark contradiction to the EIS/EIR's own description of the impacts and to common sense. AG.97

This section of the EIS/EIR should be completely revised and recirculated for public comment. (Ex. B, § 4.9.) The EIS/EIR should also be revised to analyze measures that will actually mitigate these visual impacts. The BLM has a statutory mandate to place the protection of scenic values on equal footing with with other resources. (FLPMA, 43 U.S.C. §§ 1701(a)(8), 1711(a).)

The following are merely examples of the flawed analyses contained in the EIS/EIR's visual quality impact section. As Thomas Reid Associates concluded, "[a]ll project components will conflict with the [Visual Quality Objectives] VQO's." (Ex. B, § 4.9.)

A. Steam Plumes

One example of the EIS/EIR's flawed analysis approach is its treatment of steam plumes from the cooling towers and well venting. The EIS/EIR finds that well venting plumes and cooling tower plumes would be visible from several Forest roads including Route 49, which is a scenic byway[6] (pp. 4-144, 4-148, 4-149), from Medicine Lake (p. 4-155), and from Little Mount Hoffman (p. 4-152).

AG.98

The EIS/EIR concludes that the cooling tower steam plumes will not result in long-term inconsistencies with the power plant's "Retention" Visual Quality Objectives ("VQOs") because they may not always be visible, may quickly disperse under certain weather conditions, and Forest visitors may not be able to distinguish them from clouds or other features (?) in the sky. (EIS/EIR, p. 4-138.) This

[6] EIS/EIR, p. 3-125.

conclusion is simply not believable, and is not supported by factual data. (Ex. B, § 4.9.)

The cooling tower plumes will rise from a stack protruding approximately 23 feet above the forest canopy.[7] In summer, the plumes will rise 110 feet above the cooling tower and reach 375 feet in length. In winter, the plumes will rise 250 above the tower, and reach 930 feet in length. (EIS/EIR, p. 4-139.) The EIS/EIR also acknowledges that these plumes may be visible year-round. (EIS/EIR, p. 4-139.) These plumes will be clearly visible during the nighttime, when viewsheds are particularly sensitive, even in the summer due to the low nighttime temperatures in the area. (Ex. B, § 4.9.) The plumes would be such a dominant visual feature that their visual impacts would be unmitigable. (*Ibid.*)

According to a representative of the National Park Service, the geothermal plant "has the potential to negatively impact two known contributors to [Lava Beds National Monument] park visitor's experience—natural quiet and pristine night sky." (Ex. I, Scoping Comments of George Turnbull, Superintendent, NPS (July 12, 1996) (emphasis added).) The Lava Beds Monument receives 8,000 visitors per month during the summer. Given the current annual growth rate of 3-5% per year, the number of visitors could more than triple over the Project's 50-year life. (EIS/EIR, p. 3-162.)

Dr. Fox suggests mitigation measures that could reduce or eliminate the cooling tower plumes. (Ex. A, Comment 7.b.) These are not, however, the mitigation measures recommended in the EIS/EIR.[8] These mitigation measures should be incorporated in a revised EIS/EIR as conditions of project approval. Otherwise, there is no basis to support the EIS/EIR's conclusion that these steam plumes will not cause significant environmental impacts to Lava Beds users, residents and other Forest visitors.

[7] According to the EIS/EIR, the cooling tower is 70 feet tall (p. 2-28). The turbine building, which is 92 feet tall (p. 4-148), will extend approximately 45 feet above the forest canopy (p. 4-139). Thus, the cooling tower stacks should extend approximately 23 feet above the forest canopy.

[8] The EIS/EIR also finds that the steam plume visibility impacts can be mitigated to insignificance. The proposed mitigation measures are: "Well venting shall be conducted to minimize the size and visibility of steam plumes" and "Cooling towers shall be designed to minimize the size of the steam plume." (EIS/EIR, p. 4-146.) There is no discussion of the feasibility of these proposed mitigation measures; there is no discussion of how the developer is to achieve these goals; and there is nothing to indicate that these goals can actually be accomplished.

In the absence of more information, there is no basis for concluding that the proposed measures can or will reduce the potentially significant impacts to visual quality.

B. Illumination

The EIS/EIR also mischaracterizes visual impacts caused by illumination of Project components. (Ex. B, § 4.9.) The EIS/EIR fails to analyze the visual impacts associated with the cooling tower, turbine building, or the "brilliant switchyard lighting." (*Ibid.*) As to the drill rig mast lighting, which will entail 24-hour illumination of a 145-foot tall tower, Thomas Reid Associates concluded that there is simply no way the proposed mitigation measure (4.9.2c) will mitigate impacts to insignificance. (*Ibid.*) The forest canopy is approximately 40 feet tall. Thus, this lighting will extend more than 100 feet above the canopy. The glow from these lights will be seen for miles. This certainly is not the "pristine night sky" expected by the Lava Beds visitors. AG.99

C. Helicopter-Aided Construction

The EIS/EIR failed to evaluate a potential mitigation measure for visual impacts caused by transmission line and access road construction. (Ex. B, § 4.9.) According to Thomas Reid Associates, helicopter-aided construction is often used in remote areas to eliminate the need for access roads. Such a mitigation measure could eliminate up to 90 acres of land disturbance, and the visual impacts associated with that disturbance. (*Ibid.*) The EIS/EIR should analyze the feasibility of this mitigation measure. AG.100

XII. LAND USE AND RECREATION

To the extent the EIS/EIR fails to accurately assess and mitigate Project impacts, it also fails to properly assess impacts to land use and recreation. The following examples demonstrate how the EIS/EIR fails to provide sufficient information to assess impacts to recreational users, and disregards the severity of these impacts. AG.101

A. Failure to Provide Sufficient Data to Assess Impacts to Recreational Users

The EIS/EIR provides some general information about recreational users in the area. However, according to Thomas Reid Associates, the type of information provided does not allow a proper assessment of the Project's impacts to these users. (Ex. B, § 4.11.) For example, the EIS/EIR does not provide information about where hikers and other users are located, so a proper analysis can be conducted based on how many users will be in the zones of impact. (*Ibid.*) AG.102

B. Disregard for Concerns of Recreational Users

According to CEQA, a project may have a significant impact on the environment if it will conflict with established recreational uses of an area. (CEQA Guidelines, App. G(w).) Nearly all of the Project components will be located on public land within the Klamath and Modoc National Forests. (EIS/EIR, p. 3-151.) The scenic, geologic, biologic, and historic resources of thes Forests provide diverse year-round recreational opportunities. (*Id.* at p. 3-153.)

The available recreational activities encompass both intensive and dispersed recreational uses. Approximately 40,000 recreationalists visit the Medicine Lake area every year and this use has increased by 8% to 10% over the past three years. (*Id.* at p. 3-157.) Activities include camping, fishing, picnicking, boating, swimming, and hiking. (*Id.* at p. 3-156.) Approximately 80% of the recreational activities in the Modoc and Klamath National Forests relate to dispersed recreation uses such as camping, nature study, hiking, snowmobiling, and cross-country skiing. (*Id.* at pp. 3-158 to 3-159.) The Doublehead Ranger District in the Modoc National Forest receives over 200,000 such visits per year. There are no plans to develop these dispersed recreational lands for intense recreational use. (*Id.* at p. 3-158.) AG.103

The Project will adversely alter the overall character of the area by affecting sights, sounds, and air quality. (*Id.* at p. 4-191.) The EIS/EIR, however, repeatedly takes the position that any recreational users who are bothered by Project views, noise, dust, or odors can "move out of the vicinity or make a decision not to hunt or hike in proximity" to the Project. (*Id.* at pp. 4-192, 4-193,) "The visitor's ability to modify plans to avoid activities that may be perceived as bothersome or annoying would minimize the negative effects of the project on the overall recreation experience." (*Id.* at pp. 4-192, 4-193.) Thus, the EIS/EIR places the burden on

innocent third parties to avoid the Project's effects. It is ridiculous to expect forest users who seek a wilderness experience to modify their plans and leave the area. This is inappropriate and conflicts with established recreational uses of the area. The EIS/EIR should discuss this conflict and propose mitigation measures to reduce the Project's impacts on recreational users.

The EIS/EIR's approach to the impacts to these users – that they can simply move if they are disturbed by the Project, misses the point. The fact that these visitors can move to another part of the Forest does not mean they are not impacted by the Project. On the contrary, forcing visitors to move demonstrates that the Project has a significant impact on these visitors. These users visit the Forests to experience a pristine natural setting. Thus, they are likely to be particularly disgruntled to discover that their wilderness experience has been disrupted by loud noises, ground-shaking, foul odors, and acute health effects.

The EIS/EIR should be revised to include a more realistic and considerate assessment of the impacts to recreational users.

XIII. TRANSPORTATION

A. Trip Generation Miscalculations

The EIS/EIR underestimates the Project's trip generation potential by more than 40%. The EIS/EIR should be revised to include the correct estimate and a reevaluation of the Project's impacts and required mitigation measures.

The EIS/EIR estimates maximum Project-generated traffic at 228 trips per day during the construction phase. This includes 160 construction worker trips, and 68 truck trips. (EIS/EIR, p. 4-211.) This number appears to be a miscalculation. The EIS/EIR claims to have based the construction worker trips on the maximum workforce. However, the maximum work force is 160 workers per day. (EIS/EIR, p. 4-297.) Thus, the EIS/EIR should have estimated maximum construction worker trips at 320 per day (160 workers X 2 trips per day). This correction brings total Project-generated trips to 388 per day, 70% more than estimated in the EIS/EIR. AG.104

The majority of these trips would occur over Primary Forest Route 15 or 77 to Forest Road 44N01 to Forest Road 44N64. (EIS/EIR, pp. 4-211-212.) According to the EIS/EIR, Routes 15 and 77 are adequately designed to accommodate traffic AG.105

levels of 228 per day. There is insufficient information to determine whether these routes could handle 388 trips per day. However, Roads 44N01 and 44N64 have current traffic volumes of only 10 to 20 trips per day.

The EIS/EIR estimated that 228 trips per day "would exceed the traffic capacity that could be safely accommodated on these two roads[,]" thus resulting in a significant impact. (EIS/EIR, p. 4-212.) As mitigation, the EIS/EIR recommends that Calpine improve these roads to ensure that projected traffic volumes can be safely accommodated. (EIS/EIR, p. 4-213, Mitigation Measure 4.12.1a.) It is unclear, however, whether these roads can be designed to safely accommodate 388 daily trips, 19 to 39 times the current traffic volumes. Moreover, the EIS/EIR failed to discuss potential impacts associated with these road improvements (e.g., vegetation removal, construction vehicle emissions). The EIS/EIR should be revised to include this information and, if necessary, proposed additional mitigation to mitigate these impacts to insignificance.

B. Failure to Analyze Hazardous Materials Transportation Impacts

As discussed in more detail below, the EIS/EIR fails to properly analyze the Project's potential impacts from transportation of various hazardous wastes and materials. (*See* Health & Safety comments.) The EIS/EIR should be revised to include this information. AG.106

XIV. AIR QUALITY

Dr. Fox undertook an extensive analysis of the Project's air quality impacts. (*See* Ex. A, Comments 1-7.) She concluded that the EIS/EIR's analyses of these impacts are fundamentally flawed. They are not based on verifiable emissions estimates or standard methodologies, they grossly underestimate Project emissions, they fail to analyze several significant emissions sources, and they fail to analyze and recommend several feasible mitigation measures. (*Ibid.*) Dr. Fox's findings are set forth in detail in Exhibit A and summarized below. AG.107

A. Flawed Modeling Methods

The EIS/EIR failed to properly model air emissions. (Ex. A, Comment 1.a.) The standard practice, and the one recommended by the California Air Pollution Control Officers Association ("CAPCOA"), is to analyze emissions impacts at AG.108

hundreds of locations in a grid-like format. This is because air quality standards must be met <u>everywhere</u>, not just at certain locations.

The EIS/EIR did not use this approach. Instead, it selected 22 receptor locations, virtually all of which are upwind of the Project's emission sources. Moreover, the EIS/EIR withholds key information about how the modeling was performed, which prevents the public from evaluating the accuracy of the modeling.

The Project's emissions should be remodeled based on standard methodologies, and included in a recirculated draft EIS/EIR so the public can review and comment on these issues. (*See* Ex. A, Comment 1.a. for a more detailed explanation of this issue.)

B. Absence of Supporting Emissions Data

Emission estimates are the building blocks of an EIS/EIR's air quality analysis. Thus, they are crucial to an understanding of a project's air quality impacts. As Dr. Fox explains, the EIS/EIR fails to provide supporting data for its emission estimates. (Ex. A, Comment 1.b.) This is of particular concern here, because the EIS/EIR does not provide any supporting information for toxic substances used in the health risk assessment. The failure to include this information precludes the public from verifying the accuracy of the estimates and, in turn, supplying meaningful comments on the EIS/EIR. The EIS/EIR should be revised to include this data and recirculated for public review and comment. (*See* Ex. A, Comment 1.b. for additional discussion of this issue.) AG.109

C. Underestimated Emissions

According to Dr. Fox, the EIS/EIR substantially underestimates emissions of several toxic constituents. (Ex. A, Comments 1.c.-1.f.) Dr. Fox's calculations demonstrate that the EIS/EIR underestimated emissions of hydrogen sulfide (by a factor of 2), boron (by a factor of 35), and mercury (by a factor of 140,000). (*See* Ex. A, Comments 1.c.through 1.f., for further discussion of these issues.) The EIS/EIR should be revised to include the correct emissions estimates and recirculated. AG.110

D. Failure to Analyze Several Toxic Substances

The EIS/EIR also failed to analyze emissions of many toxic substances. (Ex. A, Comment 1.g.) These include radioactive elements (*e.g.*, uranium, radium, AG.111

radon),[9] flourine, bromine, lithium, strontium, barium, which are typically found in geothermal fluids and, consequently, emitted from geothermal plants. The EIS/EIR also failed to analyze emissions of chlorination byproducts (*e.g.*, chloroform), which are used in, and emitted from, cooling towers. (*See* Ex. A, Comment 1.g. for more detail.) These emissions should be analyzed and included in a recirculated EIS/EIR, along with appropriate mitigation measures. AG.112

E. Violation of PM_{10} Standards

The EIS/EIR incorrectly concluded that the Project's emissions of particulate matter ("PM_{10}") would not cause a significant impact on ambient air quality. (Ex. A, Comment 2.) This was based on two errors – underestimating the Project's emissions, and applying the wrong significance standard. According to Dr. Fox, when the Project's PM_{10} emissions are calculated correctly, they indicate that the Project will cause exceedance of the ambient air quality standards up to 25% of the time. (*See* Ex. A, Comment 2 for further discussion.) The EIS/EIR's PM_{10} analysis should be corrected and this significant impact addressed with appropriate mitigation. AG.113

F. Significant Odor Impacts

In assessing odor impacts, the EIS/EIR relied on the State significance standard for hydrogen sulfide ("H_2S"). However, as Dr. Fox explains, this standard was established over 25 years ago and more recent studies have established a much lower odor threshold. (Ex. A, Comment 3.) According to these more recent studies, the Project will cause significant odor impacts even at the underestimated levels of H_2S emissions presented in the EIS/EIR. This is a significant environmental impact that was not identified or mitigated in the EIS/EIR. (*See* Ex. A, Comment 3 for supporting data.) Thus, the EIS/EIR should be revised and recirculated for public comment. AG.114

G. Failure to Evaluate Significant Burning Emissions

The EIS/EIR failed to assess impacts associated with burning of vegetation during Project construction and operation. The EIR/EIS mentions that the project will include "slash burn of vegetation" (p. 4-228) and that there will be "limited controlled burns" (p. 4-234). The EIS/EIR refers to controlled burns as being at the power plant site or along the transmission line (p. 4-234). However, there does not AG.115

[9] See also GRO No. 4, § 10, which requires geothermal fluids to be analyzed for radioactive content.

appear to be any discussion of the timing, extent or purpose of these burns. Appendix F, which supplies supporting information about the air quality analyses does not mention burning at all. Yet, the EIR/EIS states that the limited controlled burns could contributed to localized increases in PM_{10} in the immediate vicinity of the burn and that "slash burn" could result in exceedances of the state 24-hour PM_{10} standard in close proximity to the burning activities (p. 4-234).

According to Dr. Fox, emissions from burning could cause exceedance of the State PM_{10} standard by a factor of 2 to 12. (Ex. A, Comment 4.b.) The potentially significant impacts associated with this burning were not analyzed or mitigated in the EIS/EIR. (*See* Ex. A, Comment 4.a., for Dr. Fox's full analysis.) One potential mitigation measure for PM_{10} impacts from the proposed burning is to deliver the material to a biomass plant for disposal. Another is to deliver the material to a landfill. (Ex. A, Comment 4.a.) The EIR/EIS should discuss mitigation measures.

This burning will also generate significant emissions of several toxic air pollutants, including ammonia and carcinogenic polynuclear aromatic hydrocarbons. (*See* Ex. A, Comment 4.b., for more detail.) These emissions were not analyzed in the EIS/EIR, nor included in the Project's health risk assessment. AG.116

The EIR/EIS also fails to provide an analysis of the visibility impact of smoke from these burns. There is no discussion of whether the smoke will comply with the requirements of California Health & Safety Code section 41701 and Siskiyou County APCD Rule 4.1 regarding smoke. AG.117

Additionally, the California Health & Safety Code generally prohibits non-agricultural burning (§ 41800), with limited exceptions. One exception is for wood waste from trees, vines or bushes on property being developed for commercial purposes (§ 41802). In that case, section 41804 provides that the district board may authorize the disposal of such waste on the property where it was grown only if: AG.118

> (a) The district board finds that it is more desirable to dispose of such waste by burning than to dispose of it by other available means, such as, but not limited to, by removing it to sanitary fills.
>
> (b) The district has developed criteria for such disposal, which shall include provisions to improve the combustibility of such waste to reduce its smoke level.

(c) The state board has approved the criteria developed pursuant to subdivision (b).

Here, the Siskiyou County APCD has adopted a rule (4.3) which addresses non-agricultural burning. While Rule 4.3 contains a general prohibition against non-agricultural burning, and contains an exception for commercial development, it does not contain any finding required by 41804(a) or any criteria required by 41804(b). Thus, is does not appear that whatever non-agricultural burning is proposed complies with the California Health & Safety Code. In the absence of state-approved criteria for such burning, it does not appear that such burning can be authorized. The EIR/EIS does not discuss this issue. The issue must be discussed so that the decisionmakers and the public can evaluate the project's compliance with this requirement.

The EIS/EIR should be revised and recirculated to include information about, and mitigation for, these significant impacts.

H. Insufficient Criteria Pollutant Analysis

Dr. Fox has identified numerous ways in which the EIS/EIR's analyses of the Project's criteria pollutant emissions are flawed. (Ex. A, Comment 5.) These flaws include failing to evaluate the significance of these emissions (Ex. A, Comment 5.a.), omitting emissions of ozone precursors from the analysis (Ex. A, Comment 5.b.), and underestimating emissions of criteria pollutants (Ex. A, Comment 5.c.). AG.119

For example, the EIS/EIR does not include any analysis of volatile organic compounds (VOCs). (Ex. A, Comment 5.b.) VOCs are a criteria pollutant, and the analysis must provide information about the Project's potential to emit them. Construction of the Project will include use of drill rigs which are powered by stationary diesel engines. Such engines have the potential to emit VOCs, and those emissions should be quantified, along with any other VOC emissions from construction or operation of the Project. According to Dr. Fox, the Project would emit substantial quantities of ozone precursors. (*Ibid.*) AG.120

These errors and omissions should be remedied and a revised analysis of impacts and mitigation measures included in a recirculated EIS/EIR. The conclusion that no further federal conformity analysis is required (EIS/EIR, § 4.13.11) should also be revisited. AG.121

I. Significant and Underestimated Health Impacts

The EIS/EIR's health risk assessment underestimated impacts to public health by failing to use standard modeling methodology, substantially underestimating emissions, and omitting emissions of several highly toxic substances. (Ex. A, Comment 6.a.) The health risk assessment must be revised to accurately assess public health impacts. AG.122

The EIS/EIR also downplays the Project's significant acute health impacts. (EIS/EIR, § 4.13.8.) The EIS/EIR's health risk assessment concluded that the acute (short-term) health hazard index at the maximum exposed receptor is 1.3. (EIS/EIR, p. 4-246, F-43-55.) The significance standard for acute effects is 1.0. (EIS/EIR, p. 4-221.) Thus, the Project will cause significant health impacts. Moreover, the Project's correctly calculated acute health hazard index (Project plus background) is 1.78, which is substantially greater than the 1.0 significance threshold. (Ex. A, Comment 6.b.) AG.123

However, the EIS/EIR attempts to explain away this significant impact through what Dr. Fox characterizes as "mathematical sleight of hand." (Ex. A, Comment 6.b.) There is simply no basis for the EIS/EIR to conclude that these impacts will not be significant. The EIS/EIR should be revised to incorporate corrected health hazard indexes and to eliminate the misleading discussion about the significance of these impacts. (*See* Ex. A, Comment 6, for Dr. Fox's detailed analysis of these impacts.)

J. Dismissal of Significant Visibility Impacts

Similar to its analysis of acute health risks, the EIS/EIR finds that there will be no significant visibility impacts from the Project's air emissions, even though the EIS/EIR's own modeling indicated that these impacts would, in fact, be significant:

> The model results show exceedances of visibility thresholds (which could indicate that a plume may be visible) both outside Lava Beds and within its boundaries during construction activities, including well drilling." (EIS/EIR, p. 4-250.)

AG.124

The significance of the impact is dismissed on the grounds that (1) the Project's NOx and PM_{10} emissions rates were overestimated; (2) the modeling methodology used in the EIS/EIR overestimates visibility impacts; and (3) experience at other

geothermal fields has not produced visibility impacts. None of these provide sufficient basis to conclude that this impact will not be significant.

As to reason (1), Dr. Fox's analyses indicate that the Project's emissions were underestimated, not overestimated. (Ex. A, Comment 7.e.) With regard to (2), the EIS/EIR cannot have it both ways. If the preparers of the EIS/EIR select a particular model to assess an impact, the significance of the impact should rely on the results of that model. Moreover, the model used (VISCREEN) was the model recommended by the U.S. EPA. Rather than discounting the results of the model, the preparers should have conducted more refined visibility modeling (*e.g.*, PLUVUE II) before dismissing the impact as insignificant. (*See* EIS/EIR, p. F-57.) As for (3), the EIS/EIR provides no data about whether other geothermal fields are located in visibility-sensitive areas, such as this Project.

As Class I airsheds, the Lava Beds National Monument and Wilderness Areas are subject to the most stringent visibility standards. According to the scoping comments submitted by the National Park Service ("NPS"), "[u]nimpaired viewshed is an important part of the [Lava Beds] visitor experience." (Ex. I, Letter from George Turnbull, Superintendent, NPS (July 12, 1996).)

Despite overwhelming evidence to the contrary, the EIS/EIR concluded that this impact would not be significant. Moreover, as Dr. Fox explains, the mitigation measures proposed for this impact (*e.g.*, dust control, truck speed limits, covering trucks) will not mitigate the impacts because these control strategies were already factored into the underlying emissions calculations. (Ex. A, Comment 7.a.) The EIS/EIR should be revised to acknowledge the significance of this impact and to recommend effective mitigation measures. (*See* Ex. A, Comment 7.e. for Dr. Fox's recommended mitigation measures.) AG.125

In addition, California Health and Safety Code section 41701(b) and Siskiyou County APCD rule 4.1 contain prohibitions against discharge into the atmosphere from any source whatsoever any air contaminant, other than uncombined water vapor, for a period or period aggregating more than three minutes in any one hour which is of such opacity as to obscure an observer's view to a degree equal to or greater than smoke that is as dark or darker in what as than designated as No. 2 on the Ringelmann Chart. AG.126

Here, the EIS/EIR states that steam plumes will be emitted from well venting and from the cooling tower. (EIR/EIS, pp. 4-138-139.) That steam contains

H_2S. (EIR/EIS, pp. 4-224, 235.) The EIR/EIS states that these steam plumes will be visible. (EIR/EIS, p. 4-142.) The EIS/EIR should discuss whether these steam plumes comply with the requirements of Health & Safety Code section 41701 and SCAPCD Rule 4.1.

K. Insufficient Mitigation for Air Quality Impacts

The foregoing discussion, as supported by the analyses of Dr. Fox, demonstrates that air emissions from the Project will cause several significant impacts. These impacts have not been mitigated to significance. Dr. Fox points out several problems with the mitigation measures proposed in the EIS/EIR. (Ex. A, Comment 7.) She also identifies several additional feasible mitigation measures. These include common methods of reducing construction PM_{10} emissions (Ex. A, Comment 7.a.), mitigating cooling tower emissions (Ex. A, Comment 7.b.), reducing emissions from well ventings (Ex. A, Comment 7.c.), and limiting emissions during upset conditions (Ex. A, Comment 7.d.) AG.127

Further, the EIS/EIR repeatedly states that there are no feasible measures to mitigate PM_{10} emissions from the drill rigs during construction. However, those emissions could be mitigated if the project were required to halt or limit construction work during periods of poor air quality. That mitigation measure should be considered in the EIR/EIS. AG.128

With regard to the cooling tower emissions, Dr. Fox proposes feasible mitigation measures that are capable of reducing or eliminating the emissions and size of the visual steam plumes. (Ex. A, Comment 7.b.) For example, the use of air-cooled condensers will completely eliminate the steam plumes. (*Ibid.*) This will reduce impacts associated with air quality, as well as impacts to water quality, wildlife, vegetation, and visual resources. AG.129

The EIS/EIR should be revised to include an analysis of all feasible measures for mitigating the Project's significant impacts. Failure to do so violates the requirements of CEQA and NEPA (Cal. Pub. Res. Code § 21100(b)(3); 14 CCR §§ 15126(c); *Robertson*, 490 U.S. at p. 352.), as well as the GROs (GRO No. 4.) The revised EIS/EIR should be recirculated so the public has an opportunity to comment on these mitigation measures. AG.130

L. Hexavalent Chrome Emissions

Siskiyou County APCD Rule 8.4 and CARB regulations (17 CCR § 93103) prohibit any person from adding any hexavalent chromium containing chemicals or any compound that may produce hexavalent chromium to a cooling tower. Rule 8.4 and the CARB regulations also prohibit operation of any cooling tower unless the hexavalent chromium levels do not exceed 0.15 milligrams/liter of circulating water. AG.131

The EIR/EIS shows that the proposed cooling towers will emit chromium (p. 4-244; App. F, p. F 12). The EIR/EIS should discuss whether the chromium is hexavalent chromium and should discuss whether the cooling tower will comply with District Rule 8.4 and CARB regulations.

M. Drill Rigs Are a Potential "Major Stationary Source"

The EIS/EIR's analysis of air quality impacts does not mention that there will be any restriction on the number of days that the construction equipment will be operated. The calculation of air pollutant emissions does not provide any information as to how many days of operation were assumed. (Ex. A, Comment 5.c.)

Tables 6 and 12 in Appendix F show that in Year 3, three drill rigs will be used. (EIS/EIR, pp. F-18, F-20.) Each drill rig emits a maximum of 530 pounds per day of NO_x. The emissions calculations in the EIS/EIR are inconsistent. Table 6 in Appendix F shows that a single drill rig engine will produce maximum daily NO_x emissions of 530 pounds. (EIS/EIR, p. F-18.) Table 6 and the text on pages F-1 and F-3 show that in Years 1 and 2, only one drill rig will be used. However, Table 12 in Appendix F, which shows annual NO_x emissions from the drill rigs, shows that in Year 1 annual NO_x emissions from the drill rig will be 25,990 pounds and that in Year 2 annual NO_x emissions from the drill rig will be 51,979 pounds. (EIS/EIR, p. F-20.) Emissions of other pollutants from these rigs are similarly doubled in Year 2, according to the tables in Appendix F. This implies that in Year 2, two drill rigs will be used. AG.132

The EIR/EIS should make clear how many drill rigs will be used in each year. If all three drill rigs were operated 365 days, they would emit 589,350 pounds (290 tons) of NO_x annually. In the absence of any federally enforceable limitations on operations, these emissions are large enough to constitute a major stationary source of NO_x under the federal Clean Air Act. Federally enforceable limits must be

established for the use of these rigs, or they should be considered a major stationary source.

N. Long-Term Impacts

Section 4.20 of the EIS/EIR concludes that the Project does not involve any short-term use at the expense of long-term productivity because, among other things, the Project will have lower emissions of air pollutants than traditional power generation sources. (EIS/EIR, p. 4-335.) This conclusion should be revisited in light of Dr. Fox's analysis. AG.133

The EIS/EIR also concludes that there will be no significant, irreversible environmental changes from the Project. (EIS/EIR, § 4.21, p. 4-337.) However, Dr. Fox's calculations demonstrate that air emissions from the Project (*e.g.*, arsenic, mercury, boron, acids) will cause significant impacts to Medicine Lake and other surface water bodies. (Ex. A, Comment 8.) These emissions could cause long-term impairment of these water bodies and their associated biota. Section 4.21 should be revised to analyze these potential impacts. AG.134

XV. NOISE

The EIS/EIR admits that the Project will cause significant unavoidable noise impacts to sensitive receptors. (EIS/EIR, Table S-5, p. S-18; *see also* EIS/EIR, pp. 257-58 (listing significance criteria).) However, as is noted in the letter from Thomas Reid Associates, which is attached to this letter as Exhibit B, the EIS/EIR's noise analysis is so fundamentally flawed that it is not possible to evaluate mitigation measures. Dr. Fox provides additional comments. (Ex. A, Comments 18, 19.) The document should be revised and recirculated. (Cal. Pub. Res. Code § 21092.1; 14 CCR § 15088.5; *Laurel Heights Improvement Association of San Francisco v. Regents of the University of California* (1993) 6 Cal.4th 1112, 1130.) AG.135

The EIS/EIR has characterized the Project's impacts as significant without sufficient investigation, data gathering, or reasonable analysis, as required under CEQA and NEPA. (14 CCR § 15151; *Concerned Citizens*, 42 Cal.3d at p. 935; *Seattle Audubon*, 798 F.Supp. at p. 1479.) Specifically, the EIS/EIR has failed to adequately identify Project-related noise generators and sensitive receptors such as Native American tribal members, forest users, residences, and wildlife. Also, the noise sampling methodology does not comport with standard sampling methods, but the EIS/EIR does not explain why it relied on that particular methodology. The AG.136

EIS/EIR's analysis is wholly unsupported by data, reference sources, or graphics. Without this information, the EIS/EIR not only fails to crystallize noise-related issues, but it also precludes the public and decisionmakers from evaluating the Project's impacts, mitigation measures, and alternatives. (*Seattle Audubon*, 798 F.Supp at p. 1479.) The comments of Thomas Reid Associates and Dr. Fox discuss this issue in more detail. (Ex. B. § 4.14; Ex. A, Comments 18, 19.)

Also, the EIS/EIR states that because Siskiyou County does not have jurisdiction over national Forest lands, the Siskiyou County noise compatibility standards do not apply to these Federal lands. The same statement is made regarding Modoc County. (EIS/EIR, p. 4-256 to 4-257.) That is not correct. The federal regulations implementing the U.S. Geothermal Steam Act of 1970 provide that the operator shall comply with all federal and state standards relating to control of air, land, water and noise pollution. (43 C.F.R. § 3262.6.) Additionally, the Bureau of Land Management is required to coordinate its management activities with federal, state, and local land use planning and management programs. (43 USC § 1712(c)(9).) Finally, Geothermal Resource Order No. 4, item 11.C., states that absent more restrictive noise criteria, a lessee shall not exceed noise levels of 65 dBA. The Siskiyou and Modoc county noise compatibility standards provide these more restrictive criteria. Thus, Calpine must comply with the Siskiyou and Modoc County noise compatibility standards. AG.137

The EIS/EIR should be revised and recirculated so that the public and decisionmakers can fully evaluate the Project's impacts and proposed mitigation measures. AG.138

XVI. HUMAN HEALTH & SAFETY

A. Chlorine Risk of Upset

The Project would use chlorine gas for cooling tower defouling. (EIS/EIR, pp. 2-29, 4-279.) Chlorine is an acute health hazard and highly toxic. (Ex. A, Comment 14.) This chlorine would be stored in a 1-ton metal cylinder. EIS/EIR, pp. 2-29, 4-279.) According to Dr. Fox, releases from chlorine cylinders are widely recognized to present probable, significant risks of upset. (Ex. A, Comment 14.) Thus, a risk of upset analysis is always performed when an industrial facility proposes using these types of chlorine cylinders. (*Ibid.*) AG.139

Modeling expert Robert Sears modeled a chlorine gas release to determine what health risks the public would be subjected to. (Ex. A, Comment 14 and Attached modeling results.) This modeling demonstrates that life-threatening exposures would occur at up to 1,800 feet from the release point. The exposure level which has been determined to be "immediately dangerous to life or health" would occur at up to 2,700 feet from the release. (*Ibid.*) Clearly, this constitutes a significant human health impact.

Here, the likelihood of an accident from a chlorine release would be exacerbated by the severe weather conditions at the Project site, as well as the presence of hunters in the area, whose bullets may puncture the cylinder. As Dr. Fox explains, the EIS/EIR should have analyzed these impacts. (*Ibid.*) Furthermore, inexpensive alternatives to the use of chlorine are readily available. (*Ibid.*) This mitigation measure should have been analyzed in the EIS/EIR as a method of avoiding this significant human health impact.

B. Other Hazardous Materials Exposure

In addition to chlorine gas, the EIS/EIR describes a host of other highly toxic materials which will be transported, used, and stored during various phases of the Project. (EIS/EIR, pp. 4-275-282.) These materials are so toxic that they will require employees to wear goggles, respirators, and gloves. (EIS/EIR, p. 4-280.) Nevertheless, the EIS/EIR concludes that there will be no significant health and safety impacts from these materials because all applicable regulations will be followed. (EIS/EIR, p. 4-280.) As an extra precaution, the EIS/EIR recommends that hazardous materials plans be prepared and submitted to the relevant agencies at some point in the future. (EIS/EIR, p. 4-275 (Mitigation Measures 4.15.1a – 4.15.1c.) AG.140

The EIS/EIR's finding that these impacts will be insignificant is not supported by substantial evidence. Despite the existence of regulations governing transportation, storage and use of hazardous materials, accidents still occur. The EIS/EIR acknowledges this:

> The potential for accidents to occur cannot be completely eliminated, and the potential for irreversible damage from environmental accidents would exist throughout the life of the project. Examples of environmental accidents include potential trucking accidents that could release hazardous materials to the environment, . . . or chemical

releases at the plant site from improper storage or handling of hazardous materials." (EIS/EIR p. 4-337.)[10]

Even if these spills have a low probability of occurrence, their impacts must still be assessed in the EIS/EIR. According to the NEPA regulations, an EIS contain relevant information about reasonably foreseeable significant adverse effects if the costs of obtaining this information are not exhorbitant. (40 C.F.R. § 1502.22(b).) "'[R]easonably foreseeable' includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts . . . is within the rule of reason." (*Ibid.*)

Except for describing how certain spilled materials would be contained in bermed areas, the EIS/EIR is vague and dismissive regarding what risks the public (*e.g.*, hikers, snowmobilers, hunters) would be exposed to if a spill does occur. (EIS/EIR, pp. 4-281-282.) Unlike Project employees, the public presumably would not have ready access to safety equipment such as goggles or respirators. (EIS/EIR, p. 4-280.) The EIS/EIR should discuss these risks in more detail so the public is informed of and can comment on these risks.

Regarding hazardous materials transportation, the EIS/EIR states: "The transport of these materials on regional and forest roads would not be expected to result in exposure of the public to health and safety risks." (EIS/EIR, pp. 4-279-280.) The EIS/EIR fails to discuss whether and how these materials will be transported during the winter, when roads are covered with snow and ice (EIS/EIR, pp. 4-215-216), and what additional risks of upset these weather conditions could pose. As discussed in the Transportation section, above, these roads are narrow and cannot easily accommodate additional traffic. AG.141

C. Hazardous Waste Impacts

The Project will generate several hazardous wastes, including cooling tower sludges which usually contain hazardous levels of toxic metals such as mercury and arsenic. (Ex. A, Comment 15.) However, the EIS/EIR fails to identify, characterize, and discuss the impacts associate with wastes. (*Ibid.*) As with hazardous materials, the EIS/EIR cannot simply dismiss this potential impact on the basis AG.142

[10] *See also* EIS/EIR, p. 4-281 ("Improper handling of these materials could result in the release of the materials and/or accidental spills, which could lead to human exposure and possible effects on human health and safety.").

that all applicable regulations will be followed. The EIS/EIR should have discussed the impacts associated with these wastes. (*Ibid.*)

The EIS/EIR also failed to discuss measures for mitigating the impacts of these hazardous wastes. (Ex, A, Comment 15.) As Dr. Fox explains, State and federal laws require waste minimization and recycling, where feasible. (*Ibid.*) The EIS/EIR should be revised to discuss these impacts and methods of mitigating these impacts AG.143

D. Hazards From Well Blowouts/Geothermal Fluids

The EIS/EIR's discussion of health and safety risks from well blowouts and other releases of geothermal fluids is deficient in similar respects. (EIS/EIR, §§ 4.15.3, 4.15.4.) Despite the EIS/EIR's acknowledgement that well blowouts/releases could result in uncontrolled releases of extremely hot fluids[11] and emissions of toxic hydrogen sulfide gas to the ambient air,[12] the health effects are deemed insignificant because the risks of blowouts/releases are considered low. (EIS/EIR, pp. 4-282, 4-284.) Despite the proffered control measures and mitigation measures, blowouts may still occur. (*See* EIS/EIR, p. 4-337 (examples of potential accidents with the potential for irreversible environmental damage that cannot be completely eliminated include well blowouts).) AG.144

The EIS/EIR provides some limited information about worker risks, but does not address risks to the general public. (EIS/EIR, pp. 4-282-285.) The EIS/EIR should fully inform the public about what risks they could be exposed to if they are hiking, snowmobiling, or otherwise recreating in the vicinity of the well pads. For example, there is no discussion of how far the fluids and steam would travel during a blowout/release (*e.g.*, would they remain inside the fenced areas around the well pad sumps and power plant?).[13]

[11] The temperature of the geothermal fluids would be approximately 300° F. (EIS/EIR, Fig. 3.4-1.) Exposure to these fluids could result in burns. (EIS/EIR, p. 4-284.)
[12] Hydrogen sulfide is a respiratory irritant and one of the primary constituents causing the Project to exceed the significance standard for acute health hazards. (EIS/EIR, p. F-53.) It is the main constituent of concern from geothermal fluid releases "because of its potentially hazardous health effects, especially if exposed to large concentrations." (EIS/EIR, p. 4-284.)
[13] Apparently, fencing would only be placed around the sumps at the well pads. (EIS/EIR, p. 4-291.)

E. Increased Fire Risk

According to the EIS/EIR, a project has a significant human health and safety risk if it will "[c]reate or expose people to potential public health hazards." (EIS/EIR, p. 4-274.) For fires, the EIS/EIR establishes the following significance standard:

> A significant fire hazard would be characterized as having the potential for moderate to severe public risk. This type of risk would include moderate to severe property damage or loss, or human injury or fatality. (EIS/EIR, pp. 4-274-275.)

The EIS/EIR identifies several ways in which the Project may cause fires, including welding and use of other construction-related equipment (*e.g.*, drilling rigs, power tools, heavy equipment), burning of cleared vegetation,[14] existence of transmission line (*e.g.*, conductors touching ground, electrical arcs to vegetation, line breakages from severe weather conditions). (EIS/EIR, pp. 4-285-287, 4-290-292.)

AG.145

"Escaped debris and slash burning fires are common causes" of human-induced fires in the Klamath National Forest. (Forest Service, Klamath National Forest Final Environmental Impact Statement: Land and Resource Management Plan (1994), p. 3-117.) Downed power lines could cause "potential fire damage which could result in immediate hazards to workers. Fire hazards could potentially threaten areas containing hazardous materials described above . . . Downed power lines would pose an increased fire risk in heavily forested and densely vegetated areas." (EIS/EIR, pp. 4-290-291.)

Compounding the problem is that many project facilities, including the well pads, plant site, and portions of the transmission line, are located in heavily forested areas with "high fire behavior potential." (EIS/EIR, pp. 4-287, 4-291.)

The EIS/EIR acknowledges that the Project could increase fires: "The potential for fire hazards to occur in the project vicinity could be increased during all phases of the project because the project would bring additional people, equipment, and machines into the project area." (EIS/EIR, p. 4-285.) Nonetheless,

[14] According to Dr. Fox, 5585 tons of vegetation would be burned during the construction phase alone. (Ex. A, Comment 3.)

the EIS/EIR concludes the safety procedures and mitigation measures will reduce fire hazards to a less-than-significant level. (EIS/EIR, p. 4-287.) This conclusion is simply not credible.

The EIS/EIR asserts that safety procedures and mitigation measures "would minimize the potential for the plant site and transmission line to be subject to a significant risk of fire hazard." (EIS/EIR, p. 4-287) In other words, the Project will still increase fire risk. (*See also* EIS/EIR, p. 4-337 (examples of potential accidents with the potential for irreversible environmental damage that cannot be completely eliminated include a fire from a downed transmission line). Thus, according to the EIS/EIR's significance criteria, whether this increased risk is "significant" depends on whether Project-related fires could cause human injury or death. (EIS/EIR, pp. 4-274-275.)

According to Forest Service documents, some fires simply cannot be suppressed. For example, fires on steep slopes are a function of topography and "cannot be mitigated" because the slopes "accelerate fire spread and hinder fire control activities." (Forest Service, Klamath National Forest Final Environmental Impact Statement: Land and Resource Management Plan (1994), p. 3-117.) The transmission line will cross steep slopes. (EIS/EIR, pp. 4-11-12.) The potential slope instability problems in these areas of steep terrain (EIS/EIR, p. 4-11) could also increase the risk of downed power lines and, thus, fire risk.

Other fires are not responded to vigorously. The Forest Service has a fire suppression response strategy which guides the "initial response dispatch intensity." (Forest Service, Klamath National Forest Land and Resource Management Plan (1994), pp. 4-60-62.) This strategy is based on several factors, including safety, cost efficiency, and resource threats. (*Id.* at p. 4-60.) It is designed to prevent at least 90% of fire starts from escaping. (*Id.* at p. 4-62.) Thus, even if a Project-related fire *could* be suppressed, it may not be.

Moreover, the Project's transmission line could actually impede fire-fighting efforts by interfering with helicopter suppression techniques, which are often used in remote areas like the forest. (Ex. B, § 3.15.A.) The EIS/EIR failed to analyze this potential impact.

According to the EIS/EIR, 40,000 recreational users visit the Medicine Lake area each year; the Modoc National Forest has 200,000 recreational visits per year. (EIS/EIR, pp. 3-157-158.) Approximately 80% of the users are dispersed throughout

the forest (*i.e.*, not in specific recreational sites). (EIS/EIR, p. 3-158; *see also* EIS/EIR p. 3-170 (recreationalists frequently use roads to access remote parts of the Forest).) Thus, if a fire breaks out, there is a substantial likelihood that recreational users may be injured or killed, especially if the fire is in a remote area.

The facts are clear. The Project will increase fire risk over its approximately 50-year life. Not all of these fires can or will be suppressed. People are often in the nearby forest area. Thus, Project-related fires could cause human injury or death, which is a significant impact to human health and safety. The EIS/EIR should be revised to include this information and recirculated for public comment.

F. Other Hazards From Wellfield Facilities

Except for the sump areas, the Project's wellfield facilities will not be fenced to prevent access to recreational users. (EIS/EIR, p. 4-292.) According to Dr. Fox, these facilities will present significant health and safety hazards to Forest users. (Ex. A, Comment 16.) These facilities will be particularly hazardous in winter, when high snow levels may obscure visibility and lead to collisions with pipelines and other facilities. (*Ibid.*; EIS/EIR, p. 2-35.) There is a snowmobile trail which runs directly through the wellfield. (EIS/EIR, p. 3-160, Fig. 3.11-3.) AG.146

Winter maintenance of these wellfield facilities may also result in significant health risks to workers and the public. (Ex. A, Comment 17.) According to Dr. Fox, the maintenance procedures described in the EIS/EIR are not adequate to ensure ready access to the facilities in the event of an emergency. (*Ibid.*) AG.147

The EIS/EIR's conclusion that the wellfield facilities will not cause any significant health and safety impacts is not supported by the evidence. (Ex. A, Comment 16.) The EIS/EIR should be revised to fully analyze these health impacts and to mitigate or avoid these impacts. AG.148

G. Threat of Disease

During the scoping process, the NPS indicated that "[h]antavirus and bubonic plague vectors are known to exist in the immediate area." (Ex. I, Turnbull scoping comments.) Thus, the NPS urged the lead agencies to assess the risks posed to workers from these hazards and to evaluate precautionary measures in the EIS/EIR. (*Ibid.*) AG.149

One of the significance standards for impacts to human health and safety is whether the Project will "[e]xpose people to potential health hazards." (EIS/EIR, p. 4-274.) The Project will employ hundreds of construction workers who may be exposed to hantavirus and bubonic plague, which are serious and potentially fatal diseases. Despite the concerns of the NPS and the known presence of these health risks, the EIS/EIR fails to evaluate or mitigate this impact.[15] This information should be included in the EIS/EIR and the document recirculated for public comment. Without this information, there is insufficient evidence to support the EIS/EIR's conclusion that the Project will not cause any significant health and safety impacts. (EIS/EIR, § 4.15.)

H. Insufficient Evaluation of Alternatives

The EIS/EIR's comparison of alternative transmission line routes as they related to human health and safety only addresses the electromagnetic fields ("EMF") issue. However, as discussed above, the various routes could have significant differences with respect to fire suppression capability and aircraft risk. The EIS/EIR should analyze and compare the merits of the various alternatives with respect to these issues. AG.150

XVII. SOCIOECONOMICS

The EIS/EIR fails as an informational document because it does not adequately identify and discuss the Project's socioeconomic impacts. There is no basis to conclude that the Project will not have a significant impact in this area. AG.151

A. Insufficient Information Regarding Local Employment Opportunities

The EIS/EIR fails to provide sufficient information supporting its assertion that the Project will draw on the local work force. The Project will create approximately 160 temporary construction jobs and 19 permanent jobs. (EIS/EIR, p. 4-297.) The EIS/EIR states that up to fifty percent of the temporary construction work force is expected to be drawn from the local area. (*Ibid.*) The EIS/EIR provides the 1990 unemployment rates for Siskiyou and Modoc counties, but it is unclear how these rates translate into an available local work force. (*Id.* at pp. 3-207 to 3-208.) This Project will require skilled construction workers (*id.* at p. 4-297) AG.152

[15] There is also no discussion of the potential impacts to local emergency services from workers who could potentially contract these diseases. (*See* EIS/EIR, § 4.16.7.)

and the applicant may have to search outside the local labor market for employees with these skills. Thus, there is no basis for the EIS/EIR's assertion that it will create local jobs.

The lead agency should provide data that would allow evaluation of the EIS/EIR's assertion. For example, the EIR should indicate whether the local workers possess the necessary skills for employment. It should identify how the applicant expects to draw on this labor pool. Additionally, the applicant should set a minimum goal for the hiring of local laborers. It should also identify an outreach program should it fail to meet its hiring goals. Without this information, the EIS/EIR's assertion that fifty percent of the work force will be comprised of local workers is merely conclusory and lacks an adequate factual basis.

The EIS/EIR's discussion of housing is also inadequate. The EIS/EIR states that sufficient temporary housing is available for 160 temporary employees. (*Id.* at p. 4-298.) It describes RV parks, low-cost motels, and rental housing as sources of temporary housing. Although the EIS/EIR identifies the number of local RV parks, many construction workers may not have access to an RV. The EIR/EIS does not indicate if there are sufficient low-cost motels to accommodate demand. Also, finding short-term rentals can be difficult as many landlords prefer long-term leases or may substantially increase the rent on short-term rentals. These issues should be addressed in more detail so that the public and decisionmakers can fully assess the Project's impacts on temporary housing. AG.153

B. Failure to Properly Analyze Impacts on Public Services

The EIS/EIR fails to fully evaluate the ability of agencies to respond to structural fires. It notes that the U.S. Forest Service, California Department of Forestry, and National Park Service are primarily equipped to fight wildland fires, but have limited capacity to fight structural fires. (EIS/EIR, p. 3-211.) Although Siskiyou and Modoc counties can provide some structural fire-fighting services (*ibid.*), it is unclear whether these services are sufficient. The Tulelake Multi-County Fire District, located in Modoc County, has one firehouse in the Newell area. (*Ibid.*) Without more information, the lead agency cannot evaluate this issue and propose necessary mitigation measures. AG.154

Additionally, the EIS/EIR states that the Project would have an adverse effect on emergency services because Project-related injuries may increase the demand for emergency services. (*Id.* at p. 4-304.) The EIS/EIR states the impact is AG.155

insignificant, but affords no basis for its conclusion. (*Ibid.*) The EIS/EIR should provide injury rates at comparable facilities, such as the Geyers, that will allow a determination of whether the impact on emergency services is significant.

C. Failure to Properly Assess Waste Disposal Issues

The EIS/EIR also fails to provide sufficient information regarding solid waste disposal. The Project will generate trash, mud sacks, oil, cardboard, excess concrete, scrap lumber, paper, plastic packaging, construction debris, septic waste, cooling tower sludge, and sulfur cake during construction and operations. (EIS/EIR, pp. 2-17, 2-32, 4-306.) Cooling tower sludge and sulfur cake would have to be disposed of in accordance with local, and federal regulations. (*Id.* at pp. 4-306 to 4-307.) The EIS/EIR identifies three Class III landfills located in Siskiyou County and five Class II landfills located in Modoc County. (*Id.* at p. 3-213.) The closest landfill, which is in Tulelake in Siskiyou County, is slated for closure in 2001. (*Ibid.*) The EIS/EIR states that these landfills have sufficient capacity to accommodate the Project's solid waste and that the Project would not have a significant effect on landfill capacities. (*Id.* at p. 4-306.) This discussion is inadequate for several reasons. AG.156

First, the EIS/EIR never quantifies the landfill capacities, which makes it impossible to assess whether the landfills have sufficient capacity to accommodate the Project's solid waste. Second, the EIS/EIR also fails to provide information about the landfills' distance from the Project site. Thus, it is impossible to assess whether it is feasible or realistic for the Project to utilize all of the landfills. Additionally, hauling solid waste over long distances may have other environmental effects that should be evaluated (*e.g.*, public safety hazards from accidents, roadway degradation, impacts on air quality). Finally, the EIS/EIR does not provide all of the landfill closure dates. If several landfills close during the Project's 45-year life, then the Project's solid waste disposal may have a significant impact. Hence, the lead agency should provide more information about the Project's effect on solid waste disposal. Without this information, the public and decisionmakers cannot assess the Project's impact.

The EIS/EIR also fails to discuss potential impacts associated with storage, transportation, and disposal of potentially hazardous wastes generated by the Project. This includes cooling tower sludge (4 to 12 dry tons per year), and sulfur byproducts from the H2S abatement system (240 wet tons per year if Stretford system used). (EIS/EIR, p. 2-33.) The EIS/EIR acknowledges that there are no AG.157

Class I landfills (for non-RCRA toxic wastes) or hazardous waste treatment facilities in either Siskiyou County or Modoc County. Thus these wastes must be shipped elsewhere for treatment. (EIS/EIR, p. 3-213.) Yet, the EIS/EIR fails to address these wastes in its analysis of effects on solid waste disposal facilities. (EIS/EIR, § 4.16.9.) These impacts should be addressed and included in the EIS/EIR.

The EIS/EIR states that Calpine will establish a waste reduction program to minimize the solid waste stream going to the landfill. (EIS/EIR, Mitigation measure 4.16.9a, p. 4-307.) The EIR should provide sufficient details about this program that that the public and decisionmakers can evaluate it and determine if it adequately mitigates the Project's impacts. AG.158

The EIS/EIR also fails as an information document because it fails to identify the specific statutes and regulations that will ensure that any public health risk is mitigated. For example, the EIS/EIR states that cooling tower sludge and sulfur cake will be evaluated and disposed of according to local, state, and federal regulations. (*Id.* at pp. 4-306 to 4-307.) The EIS/EIR, however, does not describe these regulations. The lead agency should identify these regulations and provide specific details as to how any impacts can be mitigated or avoided. Without this information, the public and decisionmakers cannot properly assess sludge and sulfur cake disposal and determine whether the regulations will mitigate any potential impacts. AG.159

D. Failure to Identify Additional Significant Impacts

The EIS/EIR repeatedly concludes that many potential impacts are insignificant, but provides no data to support its conclusions. Absent such information, the EIS/EIR fails as an informational document. Additionally, proposed mitigation measures fail to mitigate the Project's impacts to insignificance. Given that the EIS/EIR admits that the Project's impacts will be adverse and the proposed mitigation measures are inadequate, there is no basis to conclude that the Project will not have a significant impact. AG.160

1. Public Services

The EIS/EIR states that the Project may result in an increased demand for police, fire protection, and emergency services, and thus have an adverse impact. (EIS/EIR, p. 4-303.) For example, the Project would increase demand for police

services in the winter months. (*Ibid.*) Also, the increased potential for fire may adversely affect existing services. (*Id.* at pp. 4-303 to 4-304.) Nonetheless, the EIS/EIR assumes that this impact would be insignificant. (*Id.* at p. 4-303.) The EIS/EIR fails to provide any facts and analysis that would allow an independent evaluation of its conclusion. Without this information, the public and decisionmakers cannot determine whether the impacts are significant.

Proposed mitigation measure 4.16.7d, which requires Calpine to ensure that at least one person is trained in basic emergency aid during each of the project's phases, fails to reduce the Project's impacts on public services. (*Id.* at p. 4-305.) This measure is inadequate because it is unclear whether only one worker will be trained. If so, the EIS/EIR does not contain any provisions for the worker's illness, incapacity, or vacation. Hence, to fully ensure the safety of the facility and environs, several workers should be trained in emergency aid. Absent adequate mitigation, the lead agency cannot find that the Project's impact on public services are insignificant.

2. Property Values

The EIS/EIR's discussion of the Project's impacts on Medicine Lake property values is inadequate and contradictory. Medicine Lake is "located at the visual and topographic center of the Caldera." (EIS/EIR, p. 3-124.) It has no telephone or electricity service lines serving the basin. (*Ibid.*.) These characteristics "create a strong sense of place and remoteness to the lake and its' [sic] immediate environs." (*Ibid.*) With the exception of a few structures, "there is an overall intactness to the lake's character." (*Ibid.*) Thus, property owners experience, and have sought out, the area's pristine quality, rural character, and untainted vistas. Impairment of these qualities will diminish property values. AG.161

The Project would introduce a number of adverse impacts to the Medicine Lake area. EIS/EIR admits that construction of the transmission line near Medicine Lake and Tionesta would be both visible and audible. (*Id.* at p. 4-301.) During operations, the transmission line would be visible from Medicine Lake properties. (*Id* at p. 4-302.) Steam plumes from the power plant are would be visible and may contribute to "possible negative visitor perceptions." (*Id.* at p. 4-193.) The area would experience increased truck traffic on forest roads during the three years of construction. Helicopter noise would be audible during transmission line construction and transmission line maintenance (*Id.* at pp. 4-263, 4-266.) The

project would introduce noise related to plant operations and periodic in-fill well-drilling. (*Id.* at p. 4-193.)

The EIS/EIR claims that views of the transmission line from Medicine Lake would not be considered a significant visual effect and refers the reader to the discussion in Section 4.9 (Visual Resources) to support its claim. (*Id.* at p. 4-302.) To the contrary, Section 4.9 emphatically states that the Project's impact would be significant and unavoidable. "The visibility of well venting and cooling tower steam plumes and transmission line facilities and right-of-way clearance for segment A1 from KOPS 2, 3, and 5, however, is considered a significant unavoidable impact as *no mitigation is available* that would remove these project features from view." (*Id.* at pp. 4-156 to 4-161 (emphasis added).)[16] Further, the visibility of the steam plumes would "contribute to the overall modification of the visual characteristics of the Medicine Lake area as seen from these KOPS" and the transmission line would create "a high level of visual contrast." (*Id.* at p. 4-161.) "Therefore, with mitigation the visibility of segment A1 of the transmission line would result in a *significant unavoidable impact* as the visibility of both the transmission line and steam plumes would impact the overall visual characteristics of the Medicine Lake area." (*Id.* at p. 4-162 (emphasis added).)

Nonetheless, the EIS/EIR asserts that the transmission line's visibility is not expected to affect property values near Medicine Lake. (*Id.* at p. 4-302.) The EIS/EIR offers no basis for this assumption. Indeed, as discussed above, the EIS/EIR's discussion in section 4.9 contradicts its later evaluation of the Project's impact on property values. The EIS/EIR should provide data supporting its conclusion and explain its contradictory statements. Absent such information, it appears that the Project will significantly affect property values in the Medicine Lake area.

3. Mushroom Harvesting

The EIS/EIR fails to acknowledge that the Project will significantly affect commercial mushroom harvesting of the Matsutake Pine Mushroom (*Tricholoma magnivelane*) throughout the Project area. (EIS/EIR, p. 3-164.) The wellfield, power plant area, and transmission line segments A1, A2, and B1 all contain "suitable habitat and sources of the Matsutake mushroom." (*Ibid.*) Mushroom AG.162

[16] These key observation points (KOPS) are located in the Medicine Lake Recreation Area. KOPS 2 refers to views from the boat launch. KOPS 3 refers to views from Medicine Lake and KOPS 5 refers to views from the private recreation residence. (Table 3.9-1, p. 3-122.)

harvesting, which takes place between September and December, has increased dramatically in recent years. (*Ibid.*) In 1996, the District issued 865 harvesting permits. (*Ibid.*)

The EIS/EIR admits that the Project will have an adverse effect on mushroom harvesting, but finds the impact insignificant. (*Id.* at p. 4-206.) Project construction will result in the loss and disturbance of habitat. (*Ibid.*) The removal of larger diameter trees could affect the regeneration of mushroom populations. Construction-related dust, odor, and noise could limit or discourage mushroom harvesters, and thus, have a temporary adverse effect on the harvesters. (*Ibid.*) Harvesters will also be subjected to significant acute health impacts from the Project's air emissions, which are discussed in the comments on Air Quality. Additionally, mushroom habitat along the transmission line corridor and access roads would continue to be disturbed during the operation phase, although the EIS/EIR asserts that additional habitat would not be lost. (*Ibid.*)

The EIS/EIR's discussion fails to provide an adequate basis for its conclusion that there will be no significant impact on harvesting. It does not discuss whether local residents benefit from commercial harvesting. For example, in an area with a high unemployment rate, local residents may have come to rely on the commercial harvest and may be affected by even a small reduction in mushroom supply habitat.

Without more information regarding the Matsutake mushroom harvest, it is impossible to determine whether the Project may have a significant impact on socioeconomic resources and whether mitigation measures should be imposed. For example, construction activities could be limited during the peak harvest time as a mitigation measure or prime mushroom areas could be avoided. Given the available information, this impact could be significant.

E. Native American Culture

The EIS/EIR admits that the Project would have a significant unavoidable impact on minority and low-income populations, due to its disproportionate effect on local American Indians, but it fails to proffer adequate mitigation measures that will reduce the Project's impacts. (EIS/EIR, pp. 4-299; 4-301.) The EIS/EIR proposes mitigation measures 4.6.1d, 4.6.2a-b, and 4.6.3a-b to reduce the Project's impacts on tribal use and spiritual values. (*Id.* at p. 4-301.) These mitigation measures are inadequate for several reasons. AG.163

First, mitigation measures 4.6.1d and 4.6.2b are not described in the measures listed in Section 5 (Mitigation Monitoring and Reporting Program) or Section 4.6 (Traditional Cultural Values). Thus, it is unclear if these measures actually are included in the EIS/EIR, what these measures are, and how they may mitigate the Project's impacts. Second, mitigation measures 4.6.3a-b are inadequate for the reasons discussed in the comments on Traditional Cultural Values.

Absent information about potential mitigation measures, the lead agency cannot find that the Project's avoidable impacts would be mitigated to insignificance. Even if impacts cannot be mitigated to insignificance, the EIR/EIS should provide feasible mitigation that will at least reduce these impacts on Native American culture.

In sum, the proposed mitigation measures are inadequate to reduce the Project's effects on socioeconomic issues. These measures should be revised to address these deficiencies.

XVIII. TRANSMISSION SYSTEM RELIABILITY

The EIS/EIR concludes that the Project will have "minimal effect" on the regional power transmission system. (EIS/EIR, p. 2-38.) Even though the Project's transmission line will have the capacity to handle 300 MW of electricity produced from geothermal plants, the EIS/EIR states that its "effective capacity" is only 145 MW. (*Ibid.*) This is because the Malin-Warner transmission line, into which the Project's transmission line will feed electricity, experiences heavy wintertime south-to-north power flows. Addition of more than 145 MW from the Fourmile Hill-Glass Mountain Tap line would cause this system to become unstable and possibly require plant shutdown. (*Ibid.*) According to the system integration report prepared by the Bonneville Power Administration ("BPA"), the system may become unstable at 135 MW. (Ex. C, Comment 4.a.)[17] AG.164

In addition to causing economic losses for Calpine and other geothermal energy producers using the Tap line, plant shutdowns can cause a variety of environmental impacts. These include uncontrolled venting of geothermal fluids, which may cause significant air quality and human health impacts. (EIS/EIR, §

[17] The EIS/EIR's assertions in sections 4.18 and 4.20 that the project will improve the stability of the transmission system by supplying more power, especially in periods of peak demand, is puzzling in light of the BPA study. (EIS/EIR, pp. 4-330, 4-336-337.)

4.13.5; Ex. A, Comments 4.b., 7.d.) These impacts must be discussed in the EIS/EIR.

A. Delay of Alturas Project

According to the analysis of David Marcus, however, there are several unresolved issues about the Project's impacts to transmission system reliability. (Ex. C, Comments 5, 6, 10.) First, the BPA integration report, which the EIS/EIR relies on for its reliability assessment (EIS/EIR, p. 2-38), relies on the assumption that the "Alturas project" will be in service prior to Project operations. (Ex. C, Comment 5.) The Alturas project will substantially change the transmission grid in the Project area. However, siting issues have repeatedly delayed the project, which has not yet received all of its permits nor commenced construction. (Ibid.) AG.165

The BPA integration report specifically states that its reliability analysis is contingent on the Alturas project, and that results could change if the Alturas project is further delayed. (Ex. C, Comment 5, citing BPA integration report, p. 2.) Thus, according to Mr. Marcus, "the system reliability analysis which the [Fourmile Hill] DEIS relies upon may be seriously flawed and its conclusions unreliable." (Ex. C, Comment 5.) The EIS/EIR should reassess the Project's impacts on transmission system reliability under a scenario in which the Alturas project is not ready by the time Calpine commences its transmission activities.

B. Unresolved Voltage Control Issues

The BPA integration report also contains several caveats associated with its conclusions about the Project's reliability impacts. According to Mr. Marcus, these caveats raise several important questions about whether the Project's reliability impacts have been adequately analyzed. (Ex. C, Comment 6.) The BPA integration report calls for further study of several voltage control issues to resolve these reliability issues. The EIS/EIR does not indicate whether these reliability issues have been addressed. As discussed above, in addition to effects on other users of the transmission system, reliability problems can lead to plant shutdowns, which cause environmental impacts. This information should be included in the EIS/EIR. AG.166

C. Failure to Consider Double-Circuit Line

According to Mr. Marcus, use of a double-circuit line for the proposed Fourmile Hill-Glass Mountain Tap line could significantly reduce potential AG.167

reliability problems and, consequently, environmental impacts. (Ex. C, Comment 10.) Under the proposed transmission system (single-circuit), any outage of the Tap line would cause complete shutdown of the line. Thus, Calpine, CalEnergy, and any other users of the Tap line would be forced to shut down. (*Ibid.*)

A double-circuit line can avoid many of these problems. With a double-circuit line, if there is an outage to one line, electricity can still flow over the other line. The EIS/EIR should evaluate the pros and cons of a double-circuit line, which could mitigate system reliability impacts as well as environmental impacts associated with geothermal plant shutdowns. (*Ibid.*)

XIX. CUMULATIVE IMPACTS

A. Legal Standards for Cumulative Impact Analyses.

"Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (14 CCR § 15355(b).) Because of this potential additive effect, "'[t]he full environmental impact of a proposed . . . action cannot be gauged in a vacuum.'" (*Whitman v. Board of Supervisors of Ventura County* (1979) 88 Cal.App.3d 397, 408 [151 Cal.Rptr. 866] (quoting *Akers v. Resor* (W.D. Tenn. 1978) 443 F.Supp. 1355, 1360.) For these reasons, NEPA and CEQA require an EIR to discuss a project's potential cumulative impacts when combined with past, present, and reasonably anticipated future projects. (40 C.F.R. § 1508.7; Cal. Pub. Res. Code § 21083(b), 14 CCR §§ 15130(b), 15355(b).)

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A cumulative impact analysis must contain the following elements:

1) Either:

   a) A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, or

   b) A summary of projections contained in an adopted general plan or related planning document which is designed to evaluate regional or areawide conditions. . . ;

2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and

3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable options for mitigating or avoiding any significant cumulative effects of a proposed project. (14 CCR § 15130(b).)

CEQA's cumulative impact analysis requirement must be interpreted to afford the fullest possible protection to the environment. (*Citizens to Preserve the Ojai v. Board of Supervisors* (1985) 176 Cal.App.3d 421, 431-32, 222 Cal.Rptr. 247; *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 720, 270 Cal.Rptr. 650.)

The courts have vigorously enforced the obligation to consider cumulative impacts. As the court stated in *Citizens to Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 431 [222 Cal.Rptr. 247], quoting *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1984) 151 Cal.App.3d 61, 79 [198 Cal.Rptr. 634]:

> '[I]t is vitally important that an EIR avoid minimizing the cumulative impacts. Rather, it must reflect a conscientious effort to provide public agencies and the general public with adequate and relevant detailed information about them.' [Citation.] A cumulative impact analysis which understates information concerning the severity and significance of cumulative impacts impedes meaningful public discussion and skews the decisionmaker's perspective concerning the environmental consequences of a project, the necessity for mitigation measures, and the appropriateness of project approval. [Citation.] An inadequate cumulative impact analysis does not demonstrate to an apprehensive citizenry that the governmental decisionmaker has in fact fully analyzed and considered the environmental consequences of its action.[18]

A lead agency must find that a project may have a significant effect on the environment if "[t]he possible effects of a project are individually limited but cumulatively considerable." (Cal. Pub. Res. Code § 21083(b); *see also* 14 CCR §

[18] *See also Kings County*, 221 Cal.App.3d at pp. 721-724; *Mountain Lion Coalition v. California Fish & Game Comm'n* (1989) 214 Cal.App.3d 1043, 1048, 1050 [263 Cal.Rptr. 104].

15065(c).) The fact that a particular project's incremental impact is not significant, or is relatively small when compared to the greater overall problem, does not mean the project does not have significant cumulative impacts. This theory was rejected in *Kings County* because it would "allow[] the approval of projects which, when taken in isolation, appear insignificant, but when viewed together, appear startling." (221 Cal.App.3d at pp. 720-21.) The proper standard for a cumulative impacts analysis is whether the impacts are "collectively significant." (*Id.* at p. 721, citing 14 CCR § 15355.)

Nor does uncertainly about a project's potential cumulative impacts excuse the lead agency from analyzing those impacts. (*Terminal Plaza Corp. v. City and County of San Francisco* (1986) 177 Cal.App.3d 892, 904-905 [223 Cal.Rptr. 379].) As previously discussed, an agency must use its best efforts to discover and disclose all information reasonably possible. (14 CCR § 15144.)

Even if the lead agency finds that there are no significant cumulative impacts, the EIS/EIR must explain the basis for that conclusion. (*Terminal Plaza.*, 177 Cal.App.3d at pp. 904-905.)

B. Failure to Consider Cumulative Impacts of All Foreseeable Geothermal Development

As discussed above under the Project Piecemealing comments, the EIS/EIR fails to adequately inform the public and the agency decisionmakers about cumulative impacts from full development of the Glass Mountain KGRA. The EIS/EIR recognizes that an adequate discussion of cumulative impacts requires an analysis of all past, present and reasonably anticipated future projects. (EIS/EIR, p. 4-310.) The EIS/EIR also acknowledges that future development of the geothermal resource beyond the level formally proposed by Calpine and CalEnergy projects is reasonably foreseeable. (*See* comments in section III, above.) Nevertheless, the 48 MW CalEnergy project is the only other geothermal project deemed "reasonably foreseeable" and analyzed in the EIS/EIR's cumulative impact section. (EIS/EIR, Table 4.17-1, p. 4-311.)

The failure to analyze these reasonably foreseeable future geothermal projects violates NEPA and CEQA. The EIS/EIR should be revised to analyze 300 MW of production, at a minimum. (*See* Ex. B, § 2.0; Ex. C, Comments 2, 3, 4 (the transmission line's 145 MW "effective capacity" could easily be brought up to the 300 MW design capacity or, alternatively, the plants could simply shut down when AG.169

the transmission grid became overloaded).) Section 4.18 of the EIS/EIR, which discusses the Project's growth-inducing impacts, identifies many of the issues that the cumulative impact analysis should have discussed. (EIS/EIR, § 4.18, pp. 4-330-332.)

The EIS/EIR should be revised to include a sufficient cumulative impact analysis and recirculated for public review and comment. The following examples are illustrative of how the EIS/EIR fails to properly assess cumulative impacts. This list is not intended to be all-inclusive.

1. Cumulative Hydrology Impacts

The EIS/EIR fails as an informational document because it does not provide sufficient information about cumulative impacts on hydrologic resources. One flaw is that the EIS/EIR acknowledges that cumulative projects would place increased demands on Arnica Sink well water. (EIS/EIR, p. 4-316.) Nonetheless, the EIS/EIR concludes that any cumulative impact is not significant because there is a sufficient groundwater supply for all the projects. (*Ibid.*) However, as discussed in the hydrology comments, the EIS/EIR has severely underestimated the Project's impacts on groundwater recharge, and consequently, on Arnica Sink and local surface waters. By itself, the Project will significantly affect groundwater supplies and local surface waters. This significant impact will be compounded by the other projects. Thus, the EIS/EIR should reevaluate the cumulative projects' effects on hydrology so that the public and decisionmakers have sufficient information to evaluate the cumulative effects of these projects and mitigation measures. AG.170

Another flaw is that the EIS/EIR states that air emissions from the Calpine and CalEnergy projects would not affect water quality because pollutants would not be expected to exceed existing regulatory levels. (*Ibid.*) However, as discussed in the comments on hydrology, the Project's air emissions will have a significant impact on water quality. In particular, the Project will elevate arsenic, mercury, and boron levels and acid deposition above significance standards. Thus, the Project by itself will have a significant effect on Medicine Lake water quality. Accordingly, the EIS/EIR should discuss how this impact will be compounded by the CalEnergy project and other potential future projects, and propose appropriate mitigation measures. AG.171

Thus, the EIS/EIR's conclusion that cumulative impacts to hydrologic resources will be insignificant is based on unsupported assumptions, inadequate

information, and insufficient mitigation measures. Without an adequate analysis of the Project's cumulative impacts, the Project's full environmental effect cannot be assessed and mitigation measures evaluated.

2. Cumulative Cultural Resources Impacts

The EIS/EIR's discussion of cumulative impacts to cultural resources is inadequate because the EIS/EIR fails to fully explain the basis for its conclusion or propose adequate mitigation measures. (*Citizens to Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 432.) The EIS/EIR's finding that there would no significant impact to cultural resources is inconsistent with its admission that "the project region is largely undeveloped and likely contains a large number of undiscovered cultural resources . . . ." (EIS/EIR, p. 4-317.) Because there may be a large number of undiscovered culturally valuable sites, it appears that the cumulative projects' chances of disturbing these resources would be even greater. Additionally, as discussed in the comments on Cultural Resources, the EIS/EIR has failed to provide sufficient information to evaluate the Project's impacts on cultural resources. Accordingly, its discussion cannot serve as the basis for a discussion of cumulative impacts. The EIS/EIR should provide a reasonable analysis of the Project's impacts in connection with other projects so that the public and decisionmakers can fully assess these cumulative impacts. AG.172

Also, the EIS/EIR states that cumulative impacts to cultural resources are not expected to be significant because a mitigation program, similar to the one proposed for the Project, would be sufficient to reduce any adverse impacts to these resources. (*Id.* at p. 4-317.) However, as discussed in the comments on cultural resources, the proposed mitigation measures are insufficient to reduce this Project's impacts on cultural resources. Thus, a similar mitigation program also would fail to reduce cumulative impacts to these resources. Absent adequate mitigation measures, the lead agency has no basis for concluding that there will be no cumulative impact on cultural resources. AG.173

3. Cumulative Vegetation Impacts

The EIS/EIR fails to provide an adequate analysis of the project's cumulative vegetation impacts. The EIS/EIR acknowledges that cumulative projects would potentially disturb or remove approximately 28,000 acres of vegetated land. (EIS/EIR, p. 4-318.) Nonetheless, the EIS/EIR concludes that the Project and the CalEnergy project would not significantly contribute to total cumulative vegetation loss because vegetation removal would only constitute approximately two percent of AG.174

the total disturbed acreage. (*Ibid.*) The EIS/EIR's analysis fails to recognize that the issue is not the Project's percentage contribution to total vegetation loss, but whether *any* vegetation loss is significant in light of the existing environment. (*See, e.g., Kings County,* 221 Cal.App.3d at p. 718; *see also* 14 CCR § 15355 (individually minor projects can contribute to cumulative impacts).)

The EIS/EIR finds that the cumulative projects would not have a significant impact upon seral stage red fir forest and/or sensitive plant species because the projects' mitigation measures would reduce any adverse impacts to these species. (*Id.* at p. 4-318 to 4-319.) However, the EIS/EIR's statement concerning mitigation measures is totally unsupported. Given the Project's own inadequate mitigation measures and the possibility that the other projects' undetermined mitigation measures may be inadequate, there is no basis for the lead agency to conclude that the potential mitigation measures would be sufficient to alleviate the significant impacts. AG.175

The EIS/EIR also states that geothermal emissions will not significantly affect vegetation. (*Id.* at p. 4-319.) As discussed in the comments on vegetation, however, toxic metals such as boron, fluorine, bromine, lithium, and barium will have a significant adverse effect on local vegetation. The CalEnergy project probably will have similar impacts. The EIS/EIR should consider the cumulative impacts of these two geothermal projects and other foreseeable projects on vegetation and evaluate mitigation measures. AG.176

By understating information regarding the severity and significance of cumulative impacts, the EIS/EIR impedes meaningful review of the Project's environmental consequences. Thus, the EIS/EIR is deficient as an informational document.

4. Cumulative Wildlife Impacts

The EIS/EIR acknowledges that the projects could result in cumulative impacts to wildlife habitat and special status species. (EIS/EIR, p. 4-319.) Nonetheless, the EIS/EIR asserts that these cumulative impacts are insignificant. The EIS/EIR's analysis is flawed for several reasons. First, the EIS/EIR states that the Calpine and CalEnergy projects' contribution to the loss of 28,000 acres would be insignificant because it would be only a "minor contribution" to the total affected acres. (*Ibid.*) This analysis fails to recognize that cumulative impacts can result from individually minor, but cumulatively significant, projects over time. (14 CCR § AG.177

15355; *see also* Ex. D (noise and pipeline impacts on wildlife).) Further, without adequate information regarding the relative value of the habitat, there is no basis for the lead agency to conclude that habitat loss would be insignificant.

Second, the EIS/EIR asserts that mitigation measures would reduce any cumulative impacts to insignificance. (*Id.* at p. 4-320.) As discussed in the wildlife section, however, the proposed mitigation measures are inadequate. Also, the EIS/EIR's assumption that the other projects will incorporate adequate mitigation measures is wholly unsupported by any evidence. Without adequate mitigation, there is no basis for the lead agency to conclude the Project will not contribute to cumulatively significant impacts to wildlife. AG.178

Hence, the EIS/EIR is deficient because it fails to adequately analyze Project's cumulative impacts on wildlife and propose appropriate mitigation measures.

5. Cumulative Noise Impacts

The EIS/EIR acknowledges that construction of this Project and CalEnergy's project at Telephone Flat could result in significant cumulative noise impacts at Medicine Lake. (EIS/EIR, p. 4-324.) Drilling noise also would be audible in the lake area. (*Id.* at p. 4-325.) Timber-related projects may result in cumulatively adverse impacts, depending on the noise receptors in the area. (*Ibid.*) However, as discussed in the comments on noise, the EIS/EIR's noise analysis is so fundamentally flawed that it is impossible to assess the Project's own impacts on noise resources. Thus, without an adequate noise analysis, the lead agency cannot propose adequate measures to mitigate significant cumulative impacts. AG.179

6. Cumulative Socioeconomic Impacts.

The EIS/EIR finds that the Project, in combination with the other projects, would not contribute to significant cumulative impacts on socioeconomic resources. As discussed in the comments on socioeconomics, however, the EIS/EIR lacks even sufficient information to assess the significance of the Project's own impacts. The EIS/EIR's analysis of cumulative socioeconomic impacts is similarly flawed. Also, the EIS/EIR's proposed mitigation measures are inadequate to reduce the Project's impacts on socioeconomics. Accordingly, there is no basis for the lead agency to conclude that the projects will not cumulatively and significantly affect these resources. AG.180

C. Failure to Adequately Consider Cumulative Impacts of the CalEnergy Project

While the EIS/EIR purports to consider the cumulative impacts associated with the CalEnergy project, this analysis is superficial. (EIS/EIR, § 4.17.) The impacts to the various resource areas are discussed in a cursory fashion, and all impacts except traditional cultural values are dismissed as less than significant. As these comments indicate, the Calpine project will cause several significant impacts, by itself. Thus, the cumulative impacts of the Calpine project, in combination with these other projects, will causes even greater impacts. AG.181

The EIS/EIR should be revised to contain a more analytical and genuine discussion of these cumulative impacts, and should be recirculated so that the public has the opportunity to review and comment on these significant impacts.

XX. ALTERNATIVES

A. Legal Standards

1. CEQA

"The core of an EIR is the mitigation and alternatives sections." (*Citizens of Goleta Valley v. Board of Supervisors* ("*Goleta II*") (1990) 52 Cal.3d 553, 564 [276 Cal.Rptr. 410].) A major function of an EIR is to "ensure that *all reasonable alternatives* to proposed projects are thoroughly assessed." (*Id.* at p. 565-566, quoting *Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 197 [132 Cal.Rptr. 377] (emphasis added by court); *accord Laurel Heights I*, 47 Cal.3d at p. 400.)

The burden of identifying and evaluating alternatives rests with the agency, not the public. (*Laurel Heights I*, 47 Cal.3d at pp. 405-406; *Goleta II*, 52 Cal.3d at p. 568.) What constitutes a reasonable range of alternatives depends on the circumstances. (*Goleta II*, 52 Cal.3d at p. 566.) However, the Supreme Court has espoused the following rule: AG.182

> [A]n EIR for any project subject to CEQA review must consider a reasonable range of alternatives to the project, *or to the location of the project*, which: (1) offer substantial environmental advantages over the project proposal [citation]; and (2) may be 'feasibly accomplished in a

successful manner' considering the economic, environmental, social and technological factors involved. (*Ibid.*, citing Cal. Pub. Res. Code §§ 21002, 21061.1, 14 CCR § 15364, and *Citizens of Goleta Valley v. Board of Supervisors* ("*Goleta I*") (1988) 197 Cal.App.3d 1167 [243 Cal.Rptr. 339].)

Reasonable project alternatives include those that could feasibly accomplish most of the project's basic objectives, and could avoid or lessen one or more of its significant impacts. (14 CCR § 15126(d)(2).)

If certain alternatives are considered and deemed infeasible, the agency must explain its conclusion in the EIR with enough factual detail to allow the public to understand, evaluate, and respond to the conclusion. (*Laurel Heights I*, 47 Cal.3d at pp. 403-404; *San Joaquin Raptor*, 27 Cal.App.4th at pp. 736-737.)

An EIR must discuss alternatives in sufficient detail to meet the EIR's information purposes. (*Laurel Heights I*, 47 Cal.3d at p. 406.) This is also governed by a rule of reason: "'Absolute perfection is not required; what is required is the production of information sufficient to permit a reasonable choice of alternatives so far as environmental aspects are concerned. . . .'" (*Id.* at p. 407, quoting *Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979) 89 Cal.App.3d 274, 287-288 [253 Cal.Rptr. 426].)

In this case, the EIS/EIR fails to consider a reasonable range of alternatives, fails to analyze feasible alternative transmission line routes, and rejects feasible alternatives from further consideration without sufficient basis.

2. NEPA

As with CEQA, the alternatives analysis is the "heart" of NEPA. (42 U.S.C. § 4332(2)(C)(iii); 40 C.F.R. § 1502.14.) The alternatives analysis is one area in which NEPA's requirements are more stringent than CEQA's. (Remy et al., *Guide to the California Environmental Quality Act (CEQA)*, p. 19 (9th ed. 1996).) Lead agencies must "[r]igorously explore and objectively evaluate all reasonable alternatives . . . ." (40 C.F.R. § 1502.14(a).)

Where a project involves unresolved conflicts about alternative uses of available resources, the lead agency must "study, develop and describe appropriate alternatives to recommended courses of action . . . ." (42 U.S.C. § 4332(2)(E); *City of*

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New York v. U.S. Dept. of Transportation (2d. Cir. 1983) 715 F.2d 732.) This Project is a clear case of unresolved conflicts about uses of available resources. For example, the Project will cause an unavoidable significant impact to traditional cultural values by interfering substantially with traditional Native American uses and values. (EIS/EIR, § 4.6.) Thus, the EIS/EIR should study and develop any alternatives that might help resolve these conflicts.

Mr. Marcus reviewed the EIS/EIR's discussion of alternative transmission routes, as well as the BPA integration study on which the EIS/EIR relies. He concluded that the EIS/EIR failed to analyze several reasonable transmission line alternatives that have the potential to avoid or mitigate environmental impacts. (Ex. C, Comments 7, 8, 9.)

B. Failure to Consider Reasonable Range of Alternative Transmission Line Designs

The EIS/EIR rejects the idea of using a 115 kV line because of the expense of building a transformer at the Malin-Warner interconnect. (EIS/EIR, p. 2-71.) The EIS/EIR also claims a 230 kV line was chosen over a 115 kV line because a 115 kV line "either could not transmit, or would uneconomically transmit, the proposed effective capacity [145 MW] of the line." (EIS/EIR, p. 2-38.)

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However, as Mr. Marcus explains, a 115 kV line could carry the Tap line's maximum "effective capacity" of 145 MW. (Ex. C, Comment 8.) Although a 115 kV line would require the additional expense of building a transformer at the Malin-Warner interconnect, a 115 kV line would be less expensive to construct. (Ex. C, Comment 9.)

The EIS/EIR also asserts that a 115 kV line would not reduce the transmission line's environmental impacts. (EIS/EIR, p. 2-76) Mr. Marcus does not agree with this conclusion. A 115 kV line may cause fewer environmental impacts than a 230 kV line, because it requires a smaller right-of-way (less vegetation and habitat disturbance), and uses smaller poles (fewer visual impacts). (Ex. C, Comment 9.) Moreover, if the Tap line were routed to an existing 115 kV line, no transformer would be required. (Ex. C, Comment 8.) The EIS/EIR should analyze the pros and cons (economic and environmental) of using a 115 kV line versus a 230 kV line so the public and agency decisionmakers are fully informed about all reasonable project alternatives.

C. The EIS/EIR Rejects Feasible Alternative Transmission Routes Without Sufficient Basis

The EIS/EIR rejected without further analysis several northerly alternate transmission line routes on the basis that these routes "could" cause other environmental impacts. (EIS/EIR, pp. 2-71.) These routes would include direct connections with the Malin or Captain Jack substations. (Ex. C, Comment 7.) However, the EIS/EIR does not provide enough information to determine whether these routes "would" cause impacts or whether these impacts could be mitigated. (*Ibid.*) In light of the fact that the Project's proposed transmission line route will cause significant, unavoidable impacts (*e.g.*, Native American cultural values, visual), these EIS/EIR should have given more consideration to these alternative routes. (*Ibid.*) AG.185

As discussed above, the EIS/EIR also rejected the reasonable alternative of using a 115 kV line instead of a 230 kV line. One reason for rejecting this alternative was that it would require building a transformer at the Malin-Warner interconnect. (EIS/EIR, p. 2-71.) But no transformer is necessary if the Tap line is routed to an existing 115 kV line. The refusal to consider connecting with an existing 115 kV line precluded the EIS/EIR from analyzing alternative transmission line routes. (Ex. C, Comment 8.) These routes could cause even fewer environmental impacts than the proposed route, particularly if there is an existing 115 kV connect line closer than 23 miles from the generation plant or a route that requires less disturbance of the National Forests (*e.g.*, west-northwesterly). The EIS/EIR should analyze possible transmission line routes associated with connecting to an existing 115 kV line. (Ex. C, Comments 7, 8.) AG.186

XXI. CONCLUSION

As the foregoing analysis indicates, the EIS/EIR fails to comply with the requirements of NEPA and CEQA in several respects. It improperly "piecemeals" the Project by failing to consider impacts associated with all reasonably foreseeable geothermal development, it fails to properly analyze impacts and feasible mitigation measures for numerous environmental resources, it fails to properly assess the Project's cumulative impacts, and fails to evaluate a reasonable range of Project alternatives. On the whole, the EIS/EIR is patently deficient. These errors must be remedied, and the EIS/EIR recirculated for public review and comment. AG.187

Thank you for the opportunity to submit comments on this Project. We look forward to reviewing your responses to these comments (including the detailed expert comments in Exhibits A through C). AG.188

Very truly yours,

Lizanne Reynolds

Erin K.L. Mahaney

LR:dk
Attachments
(c1079-028)

RUSSELL RESOURCES, INC.
Environmental Management

950 Northgate Dr., Suite 313
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September 29, 1997

Lizanne Reynolds
Adams Broadwell & Joseph
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

Dear Ms. Reynolds:

As you requested, I have reviewed the air quality, hydrology, human health and safety, vegetation, and noise sections of the Draft Environmental Impact Statement/Report ("DEIR") on the Fourmile Hill Geothermal Development Project ("Project").[1] My comments are attached.

The DEIR contains numerous errors, omissions, and deviations from standard practices and procedures. It has substantially underestimated toxic and criteria pollutant emissions, followed improper air quality modeling protocols, omitted numerous toxic substances that would be released from the Project, used incorrect hydrologic assumptions and procedures, proposed inadequate mitigation, overlooked significant impacts, and failed to discuss and evaluate noise impacts of the transmission line, hazardous waste minimization and recycling, and vibration impacts. As a result, the DEIR has substantially understated the impacts that the Project would have on the local environment.

The Project would have numerous significant impacts that were not identified in the DEIR. These include violation of ambient PM10 standards during construction; significant odor impacts in a wide area around the facility including Lava Beds National Monument during construction, normal operation, and upset conditions; significant air quality impacts from burning of cleared vegetation; significant acute health impacts; significant water quality impacts from the deposition of metals in Medicine and other nearby lakes; significant impacts on the aquatic biota in Medicine and other nearby lakes from acid rain; significant reduction in the water level of lakes and in the discharge of springs; significant impacts to vegetation from the deposition of boron and fluorine; and significant worker and public safety impacts from accidental chlorine releases, among others.

AG.189

[1] Bureau of Land Management, U.S. Forest Service, County of Siskiyou Air Pollution Control District, and Bonneville Power Administration, Calpine Fourmile Hill Geothermal Development Project Environmental Impact Statement Environmental Impact Report, Draft, July 1997.

As discussed in my comments, the DEIR must be revised to correct these errors and omissions and to use standard procedures. The significant impacts must be discussed, mitigation evaluated and proposed, and the DEIR recirculated for public review.

Very truly yours,

Phyllis Fox /ASB

J. Phyllis Fox

AIR QUALITY

1. **The Air Quality Analyses Are Fundamentally Flawed And Do Not Support The Conclusions In The DEIR**

In air quality analyses, emissions of criteria and toxic pollutants are normally calculated and used to estimate ambient concentrations and public health and other impacts. These complex calculations are normally based on published emission factors and standard modeling protocols that are routinely used by practitioners in the field. The resulting analyses are supported by sufficient information to allow a knowledgeable reviewer to confirm their accuracy. This DEIR deviates substantially from the standard practice and has adopted procedures that are incorrect. As a result, the air quality analyses cannot be independently reviewed, violating the requirements of CEQA. AG.190

a. Air Quality Modeling Methods Are Flawed

Grid Spacing. Air quality modeling is used to determine if a project's emissions will violate a federal or State ambient air quality standard. These standards must be met everywhere, not just at locations where sensitive receptors are located. This is normally addressed by calculating ambient air quality concentrations at evenly spaced points on a grid around the modeled facility, typically at a spacing of 50 meters. This approach is essential to assure that the peak concentration is identified. Likewise, air quality modeling is used to estimate public health impacts. California Air Pollution Control Officers Association ("CAPCOA") Guidelines, which are virtually always followed in EIRs, require that these impacts be estimated for the so-called maximally exposed individual or the MEI.[1] The MEI is located by performing the modeling analysis on a grid of sufficient density to permit the estimation of maximum concentrations. An air quality grid would normally include hundreds of node points to assure that the maximum concentration is modeled. AG.191

This DEIR only estimates ambient concentrations at 22 receptor locations based on activity patterns in the Project area and only reports them for six to eight locations. (DEIR, pp. 4-225, 4-233, 4-236, 4-246, F-31.) The correct procedure would have been to use a closely spaced grid, supplemented by specific receptor locations, to assure that the maximum concentrations were identified. The net effect of calculating concentrations at only a very few preselected locations is to overlook potential impacts. All of the air quality analyses should be repeated using a standard grid and the EIR revised and recirculated for review.

Even more troubling is the conspicuous absence of any receptors adjacent to and downwind from the facility, where the highest annual average impacts would occur. According to the windrose for the site, the prevailing wind direction is from the south (14%) and southwest (16%). Winds with a southerly component occur 65 percent of the time. (DEIR, pp. 3-181, 3-

[1] CAPCOA, Air Toxics "Hot Spots" Program, Revised 1992 Risk Assessment Guidelines, October 1993.

183.) However, virtually all of the receptors that are close to the power plant where the largest impacts would occur are upwind (south to southwest) of the plant, where they would be shielded from emissions a substantial fraction of the time. All of the downwind receptors are at a substantial distance from the facility, the nearest one lying about 2 miles northeast (#12). (DEIR, Fig. 4.13-2.) While this may not significantly affect 1-hour average concentrations, it would result in a substantial underestimation of annual average concentrations and cancer health risks because the maximum annual average concentrations are virtually always downwind and close to the modeled facility.

The DEIR has not estimated the maximum hydrogen sulfide (DEIR, p. 4-236), PM10 (DEIR, p. 4-233) or public health impacts (DEIR, p. 4-246), as it is required to do. Therefore, the conclusions that ambient air quality standards for hydrogen sulfide and PM10 are not exceeded and that there are no public health impacts are not supported by the analyses and are invalid.

Modeling Protocol. Normally, an EIR presents the protocol that is used to perform the air quality analyses. This protocol must include a map that identifies the boundary of the facility and locates emission sources, the source stack parameters, and modeling assumptions. None of this information is included in the DEIR. Therefore, it is not possible to evaluate the accuracy of the modeled results. The missing information should be supplied, and the DEIR recirculated for public review. AG.192

b. No Support Is Provided For Most Emission Estimates

Emission estimates normally provide the basis for the analysis of a wide range of potential environmental impacts. For this Project, emission estimates were used to evaluate the impact of boron emissions on vegetation, of trace metal emissions on the water quality of Medicine Lake, of public health impacts, and of the degradation of ambient air quality. Because emission estimates are critical to the process of evaluating environmental impacts, an EIR must provide support for the emissions that are used so the public can review and comment on their validity.

This support must include sufficient information to allow a knowledgeable person to verify and reproduce the calculations. This information must include either the spreadsheets used to calculate the emissions or the equations and supporting assumptions. This DEIR contains neither for any source or pollutant.[2] No supporting information is provided for any of the toxic substances of concern. Emission factors must be based on standard U.S. EPA or CARB reference documents, vendor-supplied and guaranteed values, or actual measurements on a similar plant. The emission factors used to estimate most emissions from this Project were reportedly based on the "expected composition of the geothermal resource and engineering AG.193

[2] Some supporting information is provided for PM10 emissions from construction and for NOx, CO, SOx, and PM10 emissions from the drill rig. However, it is incomplete and not sufficient to allow the reproduction and confirmation of the calculations.

calculations" (DEIR, p. F-9), rather than these standard and acceptable sources. Finally, emissions for a CEQA document must be independently verified by a consultant working for the lead agency. Again, this DEIR has not followed this mandatory practice. Therefore, it is impossible to review and comment on the validity of the emissions.

The emissions of 24 toxic and other substances from this Project were estimated by the applicant, not the lead agency's consultant. All supporting assumptions and calculations have been omitted from the DEIR. Emissions from the power plant were "estimated by Calpine staff based on the expected makeup of the geothermal fluid using engineering and material balance calculations." The emissions from the wellfield were also estimated by Calpine staff "based on expected well production rates, the expected makeup of the resource, and engineering calculations." (DEIR, p. F-11.) These are the major sources of emissions from the Project. The DEIR does not provide any of the supporting data. The expected geothermal fluid composition and engineering and material balance calculations are omitted from the DEIR. Therefore, these data should be provided in the DEIR so the public can understand and review the basis of the analyses and conclusions in the DEIR. As it stands, the public has been asked to accept the applicant's representation of the Project's emissions on blind faith. As discussed in Comments 1.c through 1.f, it appears that the applicant has substantially underestimated emissions.

Accurate measurements of the chemical composition of the geothermal fluid or noncondensible gases in a reservoir is required to estimate toxic emissions from a geothermal power plant. These measurements must include all toxic substances of concern, including hydrogen sulfide and metals, as discussed in Comment 1.g. This essential information was not presented in the DEIR and apparently is not available. The DEIR claims that "[n]o geothermal fluid samples have been obtained from the geothermal system in the Fourmile Hill area, and thus no fluid analyses from the resource believed to underlie Calpine's leases are available." (DEIR, p. 3-37.) Instead, the concentrations of nontoxic substances, including silica, sodium, calcium, magnesium and chloride, in fluids from a nearby well in the Glass Mountain Known Geothermal Resource Area ("KGRA") are presented. (DEIR, p. 3-37.) However, these data are not useful for evaluating environmental impacts because they do not include any of the toxic substances of concern. Emissions, and even plant design, have apparently been based on "expected makeup" of the fluid (DEIR, pp. 2-30, F-11), which has been withheld from public view. This is unacceptable.

The composition of the geothermal fluid is the *sine qua non* for estimating emissions from the Project. It is the very foundation of most of the analyses in the DEIR. These data must be acquired and provided by the applicant to support the analyses in the DEIR. Alternatively, numerous wells have been drilled in the general area, and some apparently produce fluids which could be analyzed. (DEIR, pp. 3-37 to 3-39.) Methods are available for collecting and analyzing samples of geothermal fluids and noncondensible gases.[3] In the absence of actual data,

[3] D. Benoit and P. Hirtz, Noncondensible Gas Trends and Emissions at Dixie Valley, Nevada, Geothermal Resources Council Trans., v. 16, 1994, pp. 113-119; A.J. Ellis and W.A.J. Mahon, Chemistry and Geothermal Systems, Academic Press, New York, 1977, Chapter 5.

emissions must be estimated using industry averages for similar facilities. Neither approach has been pursued here.

The DEIR must provide the complete chemical composition of the geothermal fluid that would be processed by the proposed Project. These data should be based on actual measurements of fluids and gases from existing wells in the general vicinity unless it can be conclusively documented that such data are not reasonably obtainable. If site-specific data are not available, emissions should be estimated using emission factors for geothermal power plants located at sites with similar geologic origin, caldera structure, volcanic origin, reservoir rocks, and comparable reservoir temperatures, to the extent feasible. All emissions and resulting environmental impacts must be calculated *de novo* and thoroughly documented. The EIR must be revised accordingly and recirculated for public review so the public has the opportunity to comment on emission estimates and environmental impacts based on them. Currently, the DEIR does not provide enough information to allow meaningful public comment.

c. Hydrogen Sulfide Emissions Are Underestimated

As discussed in Comment 1.b, no support is provided for the claimed hydrogen sulfide (and other) emissions from the proposed Project. Additionally, the hydrogen sulfide emissions appear to have been substantially underestimated.

First, if geothermal fluid composition data are not available for the proposed Project, emission factors for other similar facilities and locations should have been used. Hydrogen sulfide emission data have recently been published for the Medicine Lake area, where the plant would be located.[4] These data indicate that the hydrogen sulfide emission factor for a dual-flash geothermal power plant is 0.06 lb/MWh.[5] Using this factor, the hydrogen sulfide emissions from the Project would be 26,200 lbs/yr,[6] or roughly twice as high as claimed in the DEIR (14,400 lbs/yr). (DEIR, p. 4-229.) AG.194

[4] J.E. Houck and D.W. McClain, Air Quality Assessments in Support of the Environmental Impact Statement (EIS), Oregon Air Contaminant Discharge Permit (ACDP) and Oregon Energy Facility Siting Council Certificate (EFSC) for the Newberry Geothermal Pilot Project, Geothermal Resources Council Transactions, v. 20, 1996, pp. 19-27.

[5] From Figure 2 in Houk and McClain (1996), the total hydrogen sulfide emissions for a 33 MW double-flash geothermal plant based on the Coso plant in California is 9.18 metric tonnes. This is equivalent to 0.070 lb/MWh, estimated from (9.18 MT/yr)(2.205x10^3 lb/MT)/(33 MW)(365 day/yr)(24 hr/day). The wellfield hydrogen sulfide emissions are 1.69 kg/hr based on Medicine Lake data and are 2.09 kg/hr based on Coso data. Therefore, the emission factor for the total plant based on Medicine Lake data is 0.06 lb/MWh, estimated from (1.69/2.09)(0.070 lb/MWh).

[6] Hydrogen sulfide emissions using Medicine Lake data = (0.06 lb/MWh)(24 hr/day)(365 day/yr)(49.9 MW) = 26,227 lb/yr.

Alternatively, the California Energy Commission, which has evaluated many similar plants, has published hydrogen sulfide emission factors for geothermal plants in California.[7] The Project is a 49.9 MW dual-flash geothermal power plant. (DEIR, pp. 2-4, 2-10.) The average hydrogen sulfide emission factor for eleven separate dual-flash plants in California is 0.29 pounds per megawatt hour ("lbs/MWh"). Among these, the geology of the Medicine Lake area is similar to the Coso Hot Springs KGRA, except the Coso reservoir contains more noncondensible gases than Medicine Lake and represents the high end of expected emissions.[8] The average hydrogen sulfide emission factor for this area is 0.19 lb/MWhr. Using this factor, the hydrogen sulfide emissions from the Project could be as high as 83,100 lbs/yr,[9] or nearly six times more than claimed in the DEIR. (DEIR, p. 4-229.) The DEIR does not contain any evidence to support its estimate, and it is contrary to published scientific data based on actual measurements in the same geothermal reservoir and other similar reservoirs.

Second, the DEIR states that for design purposes, it has been assumed that the hydrogen sulfide concentration in the production fluid is approximately 60 parts per million by weight ("ppmw"), although actual concentrations are expected to be lower. (DEIR, p. 2-30.) However, emissions were apparently estimated assuming the hydrogen sulfide concentration in the geothermal fluid is only 8 ppmw. (DEIR, pp. 4-241, F-11.) The higher design value should have been used to estimate emissions. Using the 60 ppmw value, the corresponding emissions would be 106,500 lbs/yr. Therefore, the DEIR's estimate is inconsistent with its own information about hydrogen sulfide concentrations. AG.195

Finally, the DEIR suggests that Fourmile Hill fluid would be similar to that from nearby Glass Mountain, and actually suggests that hydrogen sulfide concentrations could be lower than assumed based on preliminary Glass Mountain data. (DEIR, pp. 2-30, 3-39.) However, other recent documents suggest that higher concentrations of hydrogen sulfide are present in Glass Mountain fluids than assumed in the DEIR. The DEIR assumes that 60 ppmw hydrogen sulfide would be present in the geothermal fluid. About 50 percent of the hydrogen sulfide is partitioned into the noncondensible gases (DEIR, p. 2-30), and the noncondensible gases comprise about 0.25 percent of the fluid.[10] Therefore, the hydrogen sulfide concentration of the noncondensible AG.196

[7] V. Tiangco, R. Hare, K. Birkinshaw, and M. Johannis, Emission Factors of Geothermal Power Plants in California, Geothermal Resources Council Transactions, v. 19, 1995, pp. 145-151,

[8] Bonneville Power Administration ("BPA") and U.S. Bureau of Land Management ("BLM"), Newberry Geothermal Pilot Project Draft Environmental Impact Statement, 1995, p. 4-23.

[9] H_2S emissions using CEC dual-flash average emission factor for Coso KGRA = (0.19 lb/MWh)(49.9 MW)(365 days/yr)(24 hr/day) = 83,054 lbs/yr.

[10] California Energy General Corporation ("CalEnergy"), Plan of Operations for Utilization and Disposal, 33 MW Geothermal Power Plant, Glass Mountain Geothermal Unit Area, August 15, 1996, p. 27.

gases would be about 1.2 weight percent. CalEnergy's operating plan for a 33 MW geothermal power plant in the Glass Mountain KGRA states that the hydrogen sulfide content of noncondensible gases from Glass Mountain ranges from 1 to 5 weight percent and averages 3 weight percent, or about a factor of two higher than assumed in the DEIR. (CalEnergy 1996, Table 1.) Hydrogen sulfide emissions would be about 36,000 lbs/yr[11] if these data were used to estimate emissions. This is consistent with the estimate presented above using Medicine Lake data.

In sum, it appears that hydrogen sulfide emissions have been substantially underestimated by the applicant. An EIR must evaluate a Project's maximum potential emissions, not a low estimate of what they might be. Standard practice and the available information support emissions in the range of 26,200 to 106,500 lbs/yr. The much lower emissions of 14,400 lbs/yr reported by the applicant are not supported by the record. Air quality and other analyses that rely on hydrogen sulfide emissions should be revised using the higher emissions. As discussed below, these higher emissions would result in frequent exceedances of the State hydrogen sulfide standard and severe odor problems in a large area surrounding the proposed facility. The DEIR should be revised accordingly and recirculated for public review. The permit to operate for the facility should be limited to the emissions used to assess environmental impacts.

d. Boron Emissions Have Been Underestimated

Boron emissions also appear to have been substantially underestimated. Boron is present at high concentrations in reservoir fluids from the Glass Mountain KGRA. Regional Water Quality Control Board ("RWQCB") data indicate concentrations of boron in geothermal fluids from the Medicine Lake area range from 4.8 to 14.9 mg/L. (RWQCB 1982, 1989.)[12] U.S. Geological Survey ("USGS") data for thermal springs of the Modoc Plateau, California, and Klamath Falls, Oregon indicate boron concentrations range from 1 to 7.6 mg/L.[13] These concentrations are at the high end of the range found in geothermal waters from around the world. (Hartley 1978, p. 24.) As discussed above, if geothermal fluid composition data are not available for the proposed Project, emission factors for other similar facilities should have been used to estimate emissions. AG.197

[11] Revised emissions using CalEnergy noncondensible gas hydrogen sulfide concentration = (14,400 lbs/yr)(3%/1.2%) = 36,000 lbs/yr.

[12] Central Valley Regional Water Quality Control Board, Inspection Report, Union Oil Company, Glass Mountain Geothermal, Medicine Lake, CA, Well 68-8, October 6, 1989; Letter from J.J. Beall, Phillips Petroleum Company, to D.C. Joseph, North Coast Regional Water Quality Control Board, Medicine Lake Well No. 44-33, October 4, 1982.

[13] R.H. Mariner, T.S. Presser, and W.C. Evans, Geothermometry and Water-Rock Interaction in Selected Thermal Systems in the Cascade Range and Modoc Plateau, Western United States, Geothermics, v. 22, no. 1, 1993, pp. 1-15.

Boron emissions for two units at the Geyers have been published. (Lang et al., 1986, Table 1.) These data indicate that the boron emission factor for Unit 5-6 is 0.0025 lb/MWh and for Unit 13, 0.00038 lb/MWh. Using the average of these two factors, boron emissions from the Project would be 612 lbs/yr.[14] In comparison, the applicant estimated that boron emissions would only be 17.4 lbs/yr or 35 times lower.

The DEIR's analyses that rely on the applicant's unsubstantiated boron emission estimates, including the Medicine Lake deposition analysis and the vegetation assessment, should be revised using the higher emissions. As discussed below, these higher emissions would result in significant water quality impacts in Medicine Lake and would aggravate the already significant effect on vegetation. (Comments 8.a, 8.c, and 13.a.) The DEIR should be revised accordingly and recirculated for public review. The permit to operate for the facility should be limited to the emissions used to assess environmental impacts.

e. Mercury Emissions Are Underestimated

Mercury emissions also appear to have been substantially underestimated. Mercury is present at high concentrations in reservoir fluids from the Glass Mountain KGRA. RWQCB data indicate that concentrations of mercury in geothermal fluids from the Medicine Lake area are 3 µg/L (RWQCB 1982), which is on the high end of the range normally found in geothermal waters. (Hartley 1978; Ellis 1978.)

As discussed above, if geothermal fluid composition data are not available for the proposed Project, emission factors for other similar facilities should have been used to estimate emissions. Mercury emission factors have been published in two separate studies. In the first, mercury emission factors were reported based on extensive field measurements and a mercury mass balance, for four geothermal units at two separate facilities, Cerro Prieto and The Geysers Units 3, 7, and 8. The factors are 2.2, 1.6, 0.70, and 0.66 grams per megawatt per day ("g/MW-day").[15] In the second study, mercury emission factors were reported for three geothermal power plants located at Wairakei (New Zealand), Broadlands (New Zealand), and The Geysers. The factors are 0.69, 0.96, and 1.10 g/MW-day,[16] comparable to those reported by Robertson et al. (1977). All of these emission factors are substantially higher than the factor used to estimate AG.198

[14] Boron emissions using average emission factor for The Geysers = (0.0014 lb/MWh)(49.9 MW)(365 days/yr)(24 hrs/day) = 611.97 lbs/yr.

[15] D.E. Robertson, E.A. Crecelius, J.S. Fruchter, and J.D. Ludwick, Mercury Emissions from Geothermal Power Plants, Science, v. 196, 1977, pp. 1094-1097.

[16] A.J. Ellis, Geothermal Fluid Chemistry and Human Health, Geothermics, v. 6, 1978, pp. 175-182.

emissions from the Project, which is 0.0000047 g/MW-day,[17] even though mercury concentrations in the parent geothermal fluids are similar. The factor used by the applicant is simply not credible, and the DEIR provides nothing to support it.

The applicant estimates that mercury emissions from the Project during normal operations, including short-term upsets, would be only 0.000188 lbs/yr. (DEIR, p. 4-245.) This very tiny amount is inconsistent with the emission factors reported above and the substantial published information on mercury emissions from geothermal projects, which demonstrate that mercury is typically present in geothermal fluids and noncondensible gases at much higher concentrations than those represented by these tiny emission estimates.[18] Using the average of the seven independent measurements, 1.13 g/MW-day, mercury emissions from the Project would be 45 lbs/yr.[19] Even when using the lowest published mercury emission factor of 0.66 g/MW-day, emissions of mercury from the Project would be 26 lbs/yr[20] or over 140,000 times higher than estimated by the applicant. AG.199

The DEIR's analyses that rely on the applicant's unsubstantiated mercury emission estimates, including the Medicine Lake deposition analysis and the health risk assessment, should be revised using the higher emissions. These higher emissions would result in significant water quality impacts in Medicine Lake, as discussed below. The DEIR should be accordingly revised and recirculated for public review. The permit to operate for the facility should be limited to the emissions used to assess environmental impacts.

[17] Mercury emission factor used to estimate Project emissions = (0.000188 lbs Hg/yr)(454 g/lb)/(49.9 MW)(365 days/yr) = 4.69 x 10^{-6}. The Project mercury emissions are from Table 4.13-8, page 4-245 of the DEIR.

[18] R. P. Hartley, Pollution Control Guidance for Geothermal Energy Development, U.S. EPA Report EPA-600/7-78-101, June 1978, Figure 24; D.E. Robertson, J. D. Ludwick, J.C. Evans, and C.L. Wilkerson, Characterization of Gases and Trace Elements at The Geysers Geothermal Power Plants and D.E. Robertson, J.D. Ludwick, J.C. Evans, and C.L. Wilkerson, Chemical Characterization of Gases and Trace Elements in Natural Hot Springs and Fumaroles in the Mono-Long Valley, California KGRA, In: Pacific Northwest Laboratory Annual Report for 1979 to the DOE Assistant Secretary for Environment, Part 4. Physical Sciences, Report PNL-3300, February 1980, pp. 87-97; D.E. Robertson, J.S. Fruchter, J.D. Ludwick, C.L. Wilkerson, E.A. Crecelius, and J.C. Evans, Chemical Characterization of Gases and Volatile Heavy Metals in Geothermal Effluents, Geothermal Resources Council Trans., v. 2, 1978, pp. 579-582; J. Kestin, R. DiPippo, H.E. Khalifa, and D.J. Ryley, Sourcebook on the Production of Electricity from Geothermal Energy, Report DOE/RA/4051-1, March 1980, p. 802.

[19] Mercury emissions using the average reported emission factor = (1.13 g/MW-day)(49.9 MW)(365 days/yr)(1/454 g/lb) = 45.33 lbs/yr.

[20] Mercury emissions using lowest reported emission factor = (0.66 g/MW-day)(49.9 MW)(365 days/yr)(1/454 g/lb) = 26.48 lbs/yr.

f. Emissions Of Other Toxic Substances Are Underestimated.

In addition to hydrogen sulfide, mercury and boron, it appears that the emissions of other toxic substances are also underestimated, including arsenic, fluorine, sulfate, and ammonia. Emission factors and reservoir fluid data for these and other toxic substances have been published for five geothermal power plants from around the world -- Cerro Prieto, Mexico; Wairakei and Broadlands, New Zealand; Larderello, Italy; and The Geyers, USA. (Ellis 1978; Robertson et al. 1980.)[21] Using these emission factors, Project emissions would be substantially larger than estimated in the DEIR.

The concentrations of toxic substances in reservoir fluids from the Glass Mountain KGRA are comparable to those used to estimate these emission factors. The concentration of arsenic in Glass Mountain fluids ranges from 5.1 to 6.6 mg/L (RWQCB 1982, 1989), which is at the high end of the range normally found in geothermal waters. (Hartley 1978, p. 24; Ellis 1978, Table 3; Layton and Anspaugh 1981, Table IV.) Similarly, fluorine concentrations range from 5.9 to 15 mg/L in geothermal wells (RWQCB 1982, 1989) and from 1.4 to 5.4 mg/L in thermal and mineral springs in the area (Mariner et al. 1993, Table 1), well within the range normally found in geothermal resources. (Hartley 1978, p. 24.) These data clearly indicate that the applicant has underestimated toxic emissions from the Project. The DEIR should be revised to provide accurate information and be recirculated for public comment. The permit to operate for the facility should be limited to the emissions used to assess environmental impacts. AG.200

g. Many Toxic Substances Have Been Omitted From The Inventory.

The toxic emission inventory for the Project, besides underestimating emissions as discussed above, excludes a number of substances that will cause or contribute to significant environmental impacts. These substances are radioactive elements, fluorine, bromine, lithium, strontium, barium, and chlorination byproducts. AG.201

Radioactive elements are generally found in geothermal fluids. These include uranium and thorium isotopes, radium, and radon. Radon, a radioactive gas and one of the products of radium decay, is the most significant. A U.S. EPA survey of geothermal waters in the western U.S. reported a range of 13 to 14,000 picocuries per liter ("pCi/L") with a median of about 510 pCi/L.[22] A Battelle Pacific Northwest Laboratory study reported concentrations of 280 to 27,800 pCi/L in noncondensible gases from six geothermal projects in California and concluded that essentially all of the radon in the noncondensible gases is released to the atmosphere. (Robertson et al., 1978.) Another study reported radon concentrations of 10 to 1,262 pCi/L in AG.202

[21] D.W. Layton and L.R. Anspaugh, Health Impacts of Geothermal Energy, International Symposium on Health Impacts of Different Sources of Energy, June 22-26, 1981, UCRL-85334, Table IV.

[22] M.F. O'Connell and R.F. Kaufman, Radioactivity Associated with Geothermal Waters in the Western United States, Technical Note ORP/LV-75-8A, U.S. EPA, March 1976.

noncondensible gases from geothermal wells in Imperial Valley, California and Louisiana.[23] In fact, radon is so common in geothermal systems that it is used as a steam tracer[24] and in exploration.[25] Radon is a widely recognized carcinogen[26] and should have been included in the cancer risk analysis in the DEIR. (DEIR, p. 4-243.) The inclusion of radon would substantially increase cancer health risks over those reported in the DEIR.

Very high concentrations of fluorine, bromine, lithium, strontium, and barium are present in geothermal fluids and emissions from geothermal plants. (Ellis 1978; Hartley 1978.) These substances are toxic to plants and would have effects comparable to or greater than those described in Comment 13.a for boron. They should have been included in the vegetation deposition analysis in the DEIR. (DEIR, p. 4-89.) Some, most notably bromine and hydrogen fluoride, are also very toxic to humans at low concentrations and should have been included in the acute health risk assessment in the DEIR. (DEIR, pp. 4-243, 4-244.) AG.203

Chlorine would be added to the circulating water flow of the cooling tower to control the growth of algae. (DEIR, p. 2-29.) It is well known that the chlorination of circulating water produces significant amounts of trihalomethanes, including chloroform, bromodichloromethane, dibromochloromethane, and bromoform as well as chlorine. These compounds are emitted from cooling towers in the drift and by evaporation. About 20 to 30 percent of volatile compounds such as chloroform which are present in the circulating water are stripped from the cooling water on each pass through the tower.[27] AG.204

None of these substances was included in the toxic emissions inventory for the Project nor included in the environmental analyses for water quality, vegetation, and human health AG.205

[23] J.D. Ludwick, D.E. Robertson, J.S. Fruchter, and C.L. Wilkerson, Analysis of Well Gases from Areas of Geothermal Power Potential, Atmospheric Environment, v. 16, no. 5, 1982, pp. 1053-1059.

[24] Stanford University, Radon as an In Situ Tracer in Geothermal Reservoirs, EPRI Report AP-5315, August 1987.

[25] J.C. Witcher, Radon Soil-Gas Surveys with Diffusion-Model Corrections in Geothermal Exploration, Geothermal Resources Council Transactions, v. 15, 1991, p. 309.

[26] R.F. Jostes, Genetic, Cytogenetic, and Carcinogenic Effects of Radon: A Review, Mutation Research, v. 340, 1996, pp. 125-139.

[27] J.H. Smith, J.C. Harper, and Bruce C. DaRos, Atmospheric Emissions from Electric Power Plant Cooling Systems, In: R.L. Jolley et al. (Eds.), Water Chlorination. Environmental Impact and Health Effects, vol. 4, Ann Arbor Science, 1981; J.C. Harper, J.H. Smith and B.C. DaRos, Airborne Emissions from Power Plant Cooling Towers, EPRI Report EA-4706, August 1986; M. B. Rogozen, H. E. Rich, and M. A. Guttman, Sources and Concentrations of Chloroform Emissions in the South Coast Air Basin, CARB Report, April 1988.

impacts. Emissions of these substances should be estimated and used to revise the Medicine Lake deposition analysis, the vegetation deposition analysis, and the health risk assessment. The EIR should be revised and recirculated for review.

2. PM10 Impacts Are Significant

The DEIR estimates the increase in ambient concentrations of particulate matter less than 10 microns in size ("PM10") due to Project emissions and concluded that impacts were not significant because the increment plus background was less than air quality standards. (DEIR, pp. 4-232 to 4-234.) However, the calculations were done incorrectly. When the errors are corrected, the impacts are significant.

Air quality standards must be met everywhere at all times, not simply "on average" or at sensitive receptors. To determine compliance with standards, the maximum increase in concentration from an emission source must be estimated using a grid as discussed in Comment 1.a and added to the maximum background concentration. The DEIR apparently added the incremental concentration to the average background concentration instead of the maximum background concentration. When maximum background concentrations are used, which is the correct procedure, the Project's PM10 impacts are significant.

Ambient PM10 data collected by the Siskiyou County Air Pollution Control District ("SCAPCD") at four stations in the Project area are included in Attachment A. The maximum estimated 24-hour PM10 increments occur at the FR 49 receptor. They are 20.5 $\mu g/m^3$ during the first year of construction, 18.0 $\mu g/m^3$ during the third year of construction, 17.0 $\mu g/m^3$ during worst-case plant upset, and 16.5 $\mu g/m^3$ during normal operation while one well is being drilled. (DEIR, p. F-31.) The PM10 ambient air quality standard of 50 $\mu g/m^3$ would be exceeded when these increments are added to the highest ambient PM10 concentrations measured at each of these stations. For example, the ambient air quality standard of 50 $\mu g/m^3$ would be exceeded during the first year of construction up to 19 percent of the time based on the power plant site, up to 25 percent of the time based on the Medicine Lake headquarters station, up to 29 percent of the time based on the Medicine Lake station, and up to 2 percent of the time based on the Lava Beds station. Violations would also occur during the third year of construction, worst-case plant upset, and normal operation with one well being drilled. AG.206

In sum, the PM10 analyses in the DEIR demonstrate that the Project will have a significant impact on ambient air quality during the first and third years of construction, during upset conditions, and during normal operations when one well is being drilled. This is a significant impact that must be mitigated. The impacts described here would be proportionately larger if PM10 emissions were larger than those used in the DEIR. This could occur, for example, if emissions are underestimated (Comments 4 and 5.c), or additional units were constructed in this general area. The EIR should be revised to include appropriate mitigation for this significant impact and recirculated for public review.

3. Odor Impacts Are Significant

The DEIR estimates the maximum 1-hour hydrogen sulfide concentrations at 22 receptors in the vicinity of the Project. Estimated concentrations range from 0.1 $\mu g/m^3$ during normal operations at Tionesta, Tulelake, Dry Lake and elsewhere to 30.3 $\mu g/m^3$ during upset conditions at Grouse Hill. (DEIR, p. F-44.) The DEIR concludes that odor complaints would be unlikely because these concentrations are below the state hydrogen sulfide standard of 42 $\mu g/m^3$. (DEIR, pp. 4-237, 4-241.) This is not correct.

The area surrounding the Project site is pristine national forest that is used by hikers, hunters, and other recreators. Several special interest areas and a Class I wilderness area are nearby. Offensive odors are virtually absent and would be "generally perceived as negative impacts by wilderness users." The U.S. Forest Service has established guidelines for assessing air pollution odor impacts in wilderness areas. These guidelines stipulate that moderate deterioration has occurred if any air pollutant odor is detectable and severe deterioration has occurred if any air pollutant odor is the only detectable odor.[28] The concentrations of hydrogen sulfide that are estimated to occur in the vicinity of the Project, while less than the State standard, are high enough to be detected. AG.207

The State hydrogen sulfide standard was promulgated in 1970 based on a single odor panel experiment and corresponds to the geometric mean hydrogen sulfide concentration that was detected by 16 subjects.[29] Since then, numerous studies have been conducted to determine the odor threshold of hydrogen sulfide. Several parties have peer reviewed these data. The American Industrial Hygiene Association ("AIHA") in 1989 reported an acceptable range of odor threshold values for hydrogen sulfide of 1 to 18 $\mu g/m^3$, a geometric mean for recognition of 6, and a geometric mean for detection of 13 $\mu g/m^3$.[30] Another study reported an acceptable range of 0.7 $\mu g/m^3$ to 14 $\mu g/m^3$.[31] Since then, more recent work in Japan and the Netherlands using modern, state-of-the-art measuring methods has found that the odor detection threshold for

[28] D.L. Peterson, D.L. Schmoldt, J.M. Eilers, R.W. Fisher, and Robert D. Doty, Guidelines for Evaluating Air Pollution Impacts on Class I Wilderness Areas in California, U.S. Forest Service, Pacific Southwest Research Station Report PSW-GTR-136, November 1992, p. 15.

[29] The Technical Advisory Committee and the State Department of Public Health, Recommended Ambient Air Quality Standards, May 21, 1969.

[30] American Industrial Hygiene Association, Odor Thresholds for Chemical with Established Occupational Health Standards, 1989, p. 20.

[31] J.H. Ruth, Odor Thresholds and Irritation Levels of Several Chemical Substances: A Review, Am. Ind. Hyg. Assoc. J., v. 47, 1986, pp. A-142 - A-151.

hydrogen sulfide ranges from 0.4 to 0.7 μg/m³.[32] Inspectors working for the Bay Area Air Quality Management District ("BAAQMD") and the South Coast Air Quality Management District ("SCAQMD") report that odor complaints in urban areas are generally reported when ambient hydrogen sulfide concentrations reach about 1 μg/m³.

In addition to this work, two studies have determined the proportion of the exposed individuals who can detect hydrogen sulfide, who complain, and who are annoyed as a function of concentration. A study performed for California Air Resources Board ("CARB") estimated the percent of persons who were able to detect a hydrogen sulfide odor and who were annoyed by it for concentrations ranging from 0.5 ppb (0.7 μg/m³) to 200 ppb (284 μg/m³). This work was based on the then current most probable values of the mean detection threshold, the standard deviation of the threshold, the exponent of the odor intensity equation, and the ratio between the annoyance and detection threshold.[33] Since then, the Canadian Air Resources Branch has conducted studies in which panel members were administered increasing concentrations of hydrogen sulfide and their reactions were recorded in terms of detection, complaint, and annoyance. This study found that the concentration at which 50 percent of the population could detect hydrogen sulfide is 5.5 μg/m³. This work generally shows that a larger percentage of the population can detect very low concentrations of hydrogen sulfide than suggested by CARB's calculations and that a larger percentage also complained than the CARB study reported were annoyed.[34]

Most of the Project's ambient hydrogen sulfide concentrations estimated in the DEIR (DEIR, Table 4.13-6, p. F-44) exceed the reported odor thresholds for hydrogen sulfide and would be detected by some individuals exposed to these concentrations. Some of the estimated hydrogen sulfide concentrations for the Project exceed levels that have been demonstrated to result in complaints and to annoy a substantial number of people. Actual concentrations of hydrogen sulfide would be substantially higher than estimated in the DEIR because hydrogen sulfide emissions were underestimated (Comment 1.c). Therefore, odor impacts would be more severe than discussed here.

Based on the recent Japanese work, malodors from hydrogen sulfide can be detected at concentrations as low as 0.4 μg/m³. Even assuming the DEIR's estimates of hydrogen sulfide concentrations are correct, estimated maximum 1-hour hydrogen sulfide concentrations of 0.4 μg/m³ would be equalled or exceeded at over 75 percent of the sensitive receptors for one or

[32] Y. Hoshika, T. Imamura, G. Muto, L.J. Van Gemert, J.A. Don, and J.I. Walpot, International Comparison of Odor Threshold Values of Several Odorants in Japan and The Netherlands, Environmental Research, v. 61, 1993, pp. 78-83 (Attachment B).

[33] J.E. Amoore, The Perception of Hydrogen Sulfide Odor in Relation to Setting an Ambient Standard, Report Prepared for CARB, April 10, 1986 (Attachment B).

[34] G.Z. Nagy, The Odor Impact Model, Journal of the Air & Waste Management Association, v. 41, no. 9, 1991, pp. 1360-1362 (Attachment B).

more scenarios, including normal operation. (DEIR, p. F-44.) These include a number of heavily used areas including Lava Beds National Monument, Medicine Lake campgrounds, campground headquarters and cabins, Little Medicine Lake, Medicine Lake Glass Flow, and two distant snowmobile parks. A small percent of the general population would be able to detect hydrogen sulfide odors this low and some would complain and be annoyed by it.

The number of people potentially affected by hydrogen sulfide odor would increase at higher concentrations. The CARB study estimated that about 6 percent of the population is able to detect a hydrogen sulfide concentration of 1 μg/m³ and that about 1 percent of the population would be annoyed by it. Estimated maximum 1-hour concentrations equal or exceed this concentration at 17 out of the 22 sensitive receptors that were modeled for two or more of the scenarios. A concentration of 5.5 μg/m³, which would be exceeded at four nearby receptors for at least two scenarios would be detected by 30 to 50 percent of the population, would result in complaints from over 20 percent, and would annoy 5 percent of the population. A concentration of 11 μg/m³, which would be exceeded at three nearby receptors for at least two scenarios would be detected by 50 to 70 percent of the population, would result in complaints from about 35 percent, and would annoy 11 percent of the population. Finally, a concentration of 14 μg/m³, which would be exceeded at two nearby receptors (Grouse Hill, Forest Service Road 49) for at least three scenarios, including normal operation, would be detected by 56 to 80 percent of the population, would result in complaints from about 40 percent, and would annoy 17 percent of the population (Amoore 1985, Table VI; Nagy 1991, p. 1360). (DEIR, p. F-44.)

Malodors would be detected during construction, normal operation, and upset conditions. During normal operation, the detection threshold of 0.4 μg/m³ would be equalled or exceeded at 64 percent of the sensitive receptors and would reach concentrations as high as 14.7 μg/m³ at Forest Road 49 near the plant site and 15.7 μg/m³ at Grouse Hill. During the third year of construction, malodors would be detected at 77 percent of the sensitive receptors and would reach concentrations as high as 13.9 μg/m³ at Grouse Hill. During upset conditions, which are common, ranging from three or four 6-hour upsets per year up to long-term shutdowns lasting 10 to 15 days (DEIR, p. F-8), malodors would be detected at up to 82 percent of the sensitive receptors and would reach concentrations as high as 30.3 μg/m³ at Grouse Hill. (DEIR, p. F-44.)

Applying the U.S. Forest Service guidelines, moderate to severe deterioration in air quality would occur over a very large area. This is a significant environmental impact that was not identified in the DEIR. The impacts described here would be proportionately larger if hydrogen sulfide emissions were larger than those used in the DEIR. This could occur, for example, if emissions are underestimated (Comment 1.c), or additional units were constructed in this general area. Mitigation measures should be required to reduce hydrogen sulfide emissions below the hydrogen sulfide odor detection threshold of 0.4 μg/m³ in all wilderness areas accessible to the public. The DEIR should be revised and recirculated for public comment.

4. **On-Site Burning Was Not Evaluated And Is Significant**

The DEIR indicates that the plant site would be cleared and grubbed. Felled trees would be cut to commercial lengths and salvaged, sold, or hauled away for disposal. All slashed materials would be burned on-site. (DEIR, p. 2-34.) Along the transmission line right-of-way, cleared vegetation could be hauled from the site, burned on-site, or scattered over open areas in the right-of-way vicinity. (DEIR, p. 4-232.)

It is well known that burning of vegetation is a major source of criteria and toxic air pollutants. The DEIR failed to estimate emissions from burning or the corresponding impact on air quality, vegetation, wildlife, or public health. Although the DEIR did qualitatively discuss potential air quality impacts and conclude that burning could result in exceedance of the State 24-hour PM10 standard in close proximity of burning, it failed to quantify the impact or recommend any mitigation for it. (DEIR, p. 4-234.) AG.208

a. Emissions Of Criteria Pollutants From Controlled Burning Alone Are Significant

Burning emissions can be readily estimated using standard U.S. EPA procedures. The DEIR indicates that preparation of the wellfield, power plant, access roads, and transmission line sites for construction would remove 310.3 acres of predominately forested land. Of this, 47 percent is lodgepole pine forest, 29 percent is mixed conifer forest, 18 percent is other forest, and 6 percent is sagebrush, meadows, and herbaceous cover. (DEIR, Table 4.7-1.) Average available fuel (i.e., combustible material consumed in a wildfire, which excludes larger woody material such as tree trunks which would be removed from the site) in forested areas in California is 18 tons per acre ("tons/ac").[35]

Burning emissions were estimated using the average emission factors for burning of conifer logging slash debris as reported in U.S. EPA's AP-42, Sections 2.5 (Table 2.5-5) and 13.1 (Table 13.1-3). This material is similar to the debris that would be produced by clearing the Project site. These factors are 18 lbs/ton for PM10,[36] 218 lbs/ton for CO,[37] and 8.8 lbs/ton for

[35] U.S. EPA, Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, 5th Edition, Report AP-2, January 1995 ("AP-42"), Section 13.1, Wildfires and Prescribed Burning, Table 13.1-1 and p. 13.1-1.

[36] The average PM10 emission factor is calculated as (13 + 13 + 4 + 6 kg/Mg)/4 x (2 lbs/ton per kg/Mg) = 18 lbs/ton. The individual values are for broadcast slash burning of short needle and long needle conifer (fire) and dozer piled conifer from Table 13.1-3 and ponderosa pine forest residue from Table 2.5-5.

[37] The average CO emission factor is calculated as (175 + 126 + 37 + 98 kg/Mg)/4 x (2 lbs/ton per kg/Mg) = 218 lbs/ton. The individual values are for short needle and long needle broadcast slash burning of conifer and dozer piled conifer (fire) from Table 13.1-3 and ponderosa pine forest residue from Table 2.5-5.

reactive organic gases ("ROG").[38] (AP-42, Tables 2.5-5 and 13.1-3.) In addition, an emission factor of 4 lbs/ton is normally used for nitrogen oxides ("NOx") from open burning of forest residues (AP-42, pp. 13.1-3 and p. 2.5-11, note n), although higher values have been measured recently (5.1 lbs/ton).[39] Emissions of sulfur oxides are negligible, and no emission factors have been published. (AP-42, p. 13.1-6.) These values, which were derived under controlled laboratory conditions, are generally believed to be at the lower limits of what might reasonably be expected from slash burning in the field because laboratory fuels were generally free of living herbaceous vegetation, moist duff material, and soils that are always incorporated in real fuel beds[40] and which substantially increase emissions. (AP-42, p. 13.1-6.)

Multiplying these factors together yields 100,500 lbs (50 tons) of PM10,[41] 22,340 lbs (11 tons) of NOx,[42] 1.2 million lbs (609 tons) of CO,[43] and 49,200 lbs (25 tons) of ROG.[44] As discussed in Comment 7.a, construction emission thresholds are normally established to evaluate the significance of construction emissions. The DEIR fails to do this. The South Coast Air Quality Management District ("SCAQMD") has established construction emission thresholds to evaluate the significance of construction impacts for CEQA analyses. These apply in the South Coast Air Basin and the Coachella Valley, where federal and state PM10 standards are exceeded.[45] They are also applicable in the study area because ambient PM10 concentrations periodically exceed both the federal and state PM10 standards, primarily due to burning. (DEIR, AG.209

[38] The average ROG (nonmethane total organic carbon) emission factor is calculated as (3.5 + 4.2 + 5.5 kg/Mg)/3 x (2 lbs/ton per kg/Mg) = 8.8 lbs/ton. The individual values are for broadcast slash burning of short needle and long needle conifer (fire) and dozer piled conifer from Table 13.1-3 and ponderosa pine forest residue from Table 2.5-5.

[39] D.A. Hegg, L.F. Radke, P.V. Hobbs, R.A. Rasmussen, and P.J. Riggan, Emissions of Some Trace Gases from Biomass Fires, J. Geophysical Research, v. 95, no. D5, 1990, pp. 5669-5675.

[40] D.V. Sandberg, S.G. Pickford, and E.F. Darley, Emissions from Slash Burning and the Influence of Flame Retardant Chemicals, J. Air Poll. Control Assoc., v. 25, no. 3, 1975, pp. 278-281.

[41] PM10 emissions from burning slashed vegetation = (310.3 ac)(18 tons vegetation/ac)(18 lbs PM10/ton vegetation) = 100,537 lbs = 50.3 tons.

[42] NOx emissions from burning slashed vegetation = (310.3 ac)(18 tons vegetation/ac)(4 lbs NOx/ton vegetation) = 22,342 lbs = 11.2 tons.

[43] CO emissions from burning slashed vegetation = (310.3 ac)(18 tons vegetation/ac)(218 lbs CO/ton vegetation) = 1,217,617 lbs = 608.8 tons.

[44] ROG emissions (nonmethane total organic carbon) from burning slashed vegetation = (310.3 ac)(18 tons vegetation/ac)(8.8 lbs ROG/ton vegetation) = 49,152 lbs = 24.6 tons.

[45] SCAQMD, CEQA Air Quality Handbook, April 1993, p. 6-4.

p. 3-186.) In fact, peak PM10 concentrations in the study area exceed those in the SCAQMD due to burning for forest and range management, recreational campfires, and wildfires.[46]

The following table compares the SCAQMD construction emission significance thresholds with Project emissions from burning calculated as described above:

	SCAQMD Significance Threshold (tons/qtr)	Project Burning Emissions (tons/qtr)
PM10	6.75	21.7
NOx	2.5	4.8
CO	24.75	264.8
ROG	2.5	10.9

The quarterly Project burning emissions in the above table were estimated assuming that all of the clearing and associated burning occurred during the first year of construction between April and October. (DEIR, p. 2-42, 2-56.) Therefore, the total burning emissions calculated above would occur over 2.3 quarters, and quarterly emissions are estimated by dividing total emissions (e.g., PM10 = 50 tons/yr) by 2.3. This comparison shows that Project burning emissions exceed the significance thresholds by factors of two to 11 (100% to 1100%). These substantial emissions would probably result in exceedances of ambient air quality standards. Ambient PM10 data for Lava Beds, for example, include a 24-hr average PM10 concentration of 187.8 $\mu g/m^3$, which exceeds both the State standard of 50 $\mu g/m^3$ and the federal standard of 150 $\mu g/m^3$. This exceedance was attributed to prescribed burning. (SCAPCD 9/97.) The above-estimated Project burning emissions should be modeled to determine whether they would cause exceedances of the ambient air quality standards.

This is a significant impact that is not revealed in the DEIR. The EIR should be revised to include emissions from burning. Burning emissions are clearly significant and should be mitigated. There are feasible alternatives to burning cleared vegetation, including hauling it away from the site for off-site disposal and scattering it over nearby open areas. (DEIR, p. 4-232.) Therefore, the EIR should be also modified to prohibit burning. AG.210

[46] SCAPCD, Lava Beds PM10 data 6/19/96 - 12/29/96.

b. Burning Is A Significant Source Of Toxics

In addition to PM10, burning of forests and slash is also a source of a number of toxic pollutants, including dioxins,[47] acrolein,[48] polynuclear aromatic hydrocarbons,[49] ethylene,[50] methyl bromide,[51] methyl chloride,[52] chlorofluorocarbons, ammonia (Hegg et al., 1990), ozone,[53] and aldehydes, among others. Emission factors for burning have been published for many of these substances. In addition, smoke itself is a health hazard.[54] AG.211

Two studies have published emission factors for the PAHs. These indicate that 4.1 to 8.8 grams of PAHs are released when one ton of slash is burned and that the carcinogenic PAHs

[47] R.R. Bumb and others, Trace Chemistries of Fire: A Source of Chlorinated Dioxins, Science, v. 210, 1980, pp. 385-390; C. Tashiro, R.E. Clement, B.J. Stocks, L. Radke, W.R. Cofer, and P. Ward, Preliminary Report: Dioxins and Furans in Prescribed Burns, Chemosphere, v. 20, nos. 10-12, 1990, pp. 1533-1536.

[48] J.B. Terrill, R.R. Montgomery, and C.F. Reinhardt, Toxic Gases from Fires, Science, v. 200, 1978, pp. 1343-1347.

[49] R.W. Gerstle and D.A. Kemnitz, Atmospheric Emissions from Open Burning, J. Air Poll. Control Assoc., v. 17, no. 5, 1967, pp. 324-327; B.M. Jenkins, A.D. Jones, S.Q. Turn, and R.B. Williams, Emission Factors for Polycyclic Aromatic Hydrocarbons from Biomass Burning, Environmental Science and Technology, v. 30, 1996, pp. 2462-2469.

[50] M. Feldstein, S. Duckworth, H.C. Wohlers, and B. Linsky, The Contribution of the Open Burning of Land Clearing Debris to Air Pollution, J. Air Poll. Control Assoc., v. 13, no. 11, 1963, pp. 542-545.

[51] S. Mano and M.O. Andreae, Emission of Methyl Bromide from Biomass Burning, Science, v. 263, 1994, pp. 1255-1257.

[52] T.E. Reinhardt, Chlorinated Emissions in Smoke from Burning Forest Fuels, M.S. Thesis, University of Washington,Seattle, 1987; M.O. Andreae and others, Methyl Halide Emissions from Savanna Fires in Southern Africa, J. Geophysical Research, v. 101, no. D19, 1996, pp. 23,603-23,613.

[53] G. Helas and others, Ozone Production Due to Emissions from Vegetation Burning, J. Atmospheric Chemistry, v. 22, 1995, pp. 163-174.

[54] P.A. Breysse, Health Hazards of Smoke, J. Forestry, v. 82, 1984, p. 89.

comprise 3.2 to 39 percent of total. For the Project, slash burning would release 50[55] to 109[56] lbs of PAHs, including 3.4 to 19 lbs of potent carcinogens. Likewise, burning of pine, brush, and douglas fir releases 4 lbs/ton of ammonia and 2.3 g/ton of CF_2Cl_2 (Hegg et al. 1990). Therefore, the Project would emit an additional 11 tons of ammonia[57] and 28 lb of chlorofluorocarbons[58] that were not included in the DEIR's analyses. The DEIR's health risk assessment should be revised to include toxic emissions from the burning of vegetation during construction or the practice should be prohibited.

5. Criteria Pollutant Analysis Is Not Adequate

An EIR must estimate the emissions of all criteria pollutants for both construction and operation and compare the totals to emission significance thresholds. This DEIR did not evaluate the significance of emissions, omitted ROG from the inventory, and underestimated emissions of the criteria pollutants that it did include. These errors and omissions should be corrected and the EIR recirculated for public review.

a. The Significance Of Emissions Was Not Evaluated

The DEIR presents criteria pollutant emissions (DEIR, Table 4.13-3), but makes no attempt to evaluate their significance. It did perform ambient air quality modeling for two of them, PM10 and hydrogen sulfide, but this is a separate evaluation that does not substitute for an independent assessment of the emissions themselves. Many air pollution control districts in California have established emission thresholds for CEQA purposes and published them in CEQA guidelines. These thresholds are typically tied to a district standard. AG.212

For example, BAAQMD has established thresholds of significance for emissions from project operations of 15 tons/yr or 80 lbs/day for ROG, NOx, and PM10. The thresholds for ROG and NOx are equivalent to the BAAQMD offset threshold (15 tons/yr) for stationary sources (Regulation 2-2-302). The threshold for PM10 is based on the District's definition of a

[55] PAH emissions from burning of landscape residue = (4.07 g/ton)(18 tons/ac)(310.3 ac)/454 g/lb) = 50.1 lbs. (Gerstle and Kemnitz 1967, Table IV.)

[56] PAH emissions from burning of pine slash = (9731 μg/kg)(18 tons/ac)(310.3 ac)(907.18 kg/ton)/[(10^6 g/ug)(454 g/lb)] = 108.6 lbs. (Jenkins et al. 1996, Table 6.)

[57] Ammonia emissions = (310.3 ac)(18 ton/ac)(4 lbs/ton) = 22,342 lbs. The ammonia emissions factor is from Hegg et al. 1990, Table 2 for pine, brush, and douglas fir (Myrtle/Fall Creek).

[58] Chlorofluorocarbon emissions = (310.3 ac)(18 ton/ac)(2.3 g/ton) = 12,846 g = 28.3 lbs. The chlorofluorocarbon (CF_2Cl_2) emissions factor is from Hegg et al. 1990, Table 2 for pine, brush, and douglas fir (Myrtle/Fall Creek). Because this is for a single compound, total chlorofluorocarbons could be larger.

major modification to a major facility (Regulation 2-2-221).[59] Likewise, the Kern County APCD has used emission offset trigger levels as significance thresholds.[60] These levels are 15 tons/yr for PM10, 27 tons/yr for SOx, and 25 tons/yr for ROG and NOx. The SCAQMD based its operational significance thresholds in part on the federal Clean Air Act, which are 55 lbs/day (10 tons/yr) for ROG and NOx, 550 lbs/day (100 tons/yr) for CO, and 150 lbs/day (27 tons/yr) for PM10 and SOx. Separate thresholds were established by the SCAQMD for construction emissions and are 2.5 tons/qtr for ROG and NOx, 6.75 tons/qtr for PM10 and SO_2, and 24.75 tons/qtr for CO. (SCAQMD 1993, p. 6-2 to 6-4.) Finally, the San Luis Obispo APCD has established operational emission significance thresholds of 25 lbs/day (4.5 tons/yr) for ROG, NOx, SO_2, and PM10.

The SCAPCD has not published CEQA guidelines. However, using the most stringent of these, those published by the San Luis Obispo APCD which has pristine air quality comparable to Siskiyou County, operational emissions of PM10 (6.8 tons/yr) and NOx (7.0 tons/yr) from the Project would exceed the significance threshold of 4.5 tons/yr and would be significant. (DEIR, Table 4.13-3.) Likewise, using the construction significance thresholds established by the SCAQMD, construction emissions of NOx (5.7 - 43 tons/qtr) would be significant during all three years, assuming work occurs for 2.3 quarters per year. (DEIR, pp. F-20, F-21.) PM10 emissions would also be significant in all three years if they were correctly calculated (Comment 2). Because there is no information in the DEIR on emissions of ozone precursors, there is no information to determine whether or not they may be significant.

The SCAPCD must establish significance thresholds for all criteria pollutants for both construction and operation, and the DEIR must use them to evaluate the significance of Project emissions. CEQA requires that the lead agency determine whether impacts are significant, and the DEIR has demonstrated that the emissions are substantial. The lead agency must establish objective standards and apply them. It appears that under objective standards routinely used by other APCDs, emissions of PM10 and NOx from the construction and operation of the Project would be significant.

b. Ozone-Precursor (ROG) Emissions Were Omitted

Ozone is a criteria pollutant. It is often characterized and evaluated as reactive organic gases, or ROG, which are converted into ozone in the atmosphere. ROG must be included in emission inventories. Emissions of ROG were not included in the criteria pollutant emissions inventory in Table 4.13-3 and should have been. Substantial quantities of ROG would be emitted by the Project. During construction, ROG would be emitted by construction equipment AG.213

[59] BAAQMD, BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans, April 1996, p. 15 and Table 3.

[60] Kern County Air Pollution Control District, Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1990, as Amended, July 11, 1996, p. 12.

such as crawler tractors, scrapers, graders, backhoes, and trucks[61] and the drill rigs. (AP-42, p. 3.4-5.) During operation, it would be emitted by drill rigs used for infill and other drilling, the power plant backup generator, the cooling tower, and vent silencer. ROG emissions from the latter two sources are included in Appendix F and total 3,283 lbs/yr. (DEIR, p. F-14.) U.S. EPA emission factors exist for ROG from all of these sources. The EIR should be revised to include a complete ROG emission inventory and an evaluation of the significance of these emissions.

c. Criteria Pollutant Emissions Are Underestimated

The criteria pollutant emission inventory in Table 4.13-3 is incomplete and underestimates emissions from drilling and earthwork.[62] This information was supplemented in response to Public Records Act requests by Lizanne Reynolds on September 10 and 12, 1997, which are referred to here as the "Suder Files."[63] I did not receive this material until Saturday, September 27, 1997, two weekend days before comments were due. The time was inadequate to comprehensively review this material, and I reserve my right to supplement these comments. Each of these is discussed below. AG.214

Incomplete Inventory. The criteria pollutant emission inventory does not include any emissions from fugitive sources such as pumps, compressors, valves, and flanges, or the Stretford plant's vents and sulfur pit. These could be a substantial source of hydrogen sulfide which may be present at high concentrations in some internal gas streams, such as the noncondensibles and steam. The emission inventory also does not include exhaust emissions of CO, NOx, or SOx from traffic and mobile equipment used to construct the well field, power plant site, and the transmission line. (DEIR, pp. F-18 to F-21; Suder Files.) This equipment is typically a major source of these pollutants during construction. These emissions can be readily estimated using standard U.S. EPA emission factors (U.S. EPA 1991, Table 2-07). Emissions from these sources should be added to the inventory reported in Table 4.13-3. AG.215

Drill Rigs. Emissions from the drill rigs were estimated using U.S. EPA emission factors for heavy-duty stationary diesel engines (AP-42, p. 3.4-5), assuming they operated only 33 percent of the time during an average day and 67 percent of the time during the maximum hour and day. (DEIR, p. F-11; Suder Files, Diesel Engine Table.) These load factors are inconsistent with information in the DEIR and they substantially underestimate drilling rig emissions. AG.216

[61] U.S. EPA, Nonroad Engine and Vehicle Emission Study -- Report, Report 21A-2001, November 1991, Table 2-07.

[62] The DEIR estimates construction PM10 emissions as the sum of emissions from earthwork, fugitive dust from traffic, exhaust emissions from drill rigs and the backup generator and wellhead venting and flow testing. (DEIR, pp. F-9, F-10; Mooney 1997, Table 15.) Earthwork presumably refers to clearing, grubbing, filling, and grading.

[63] Letter from D.B. Mooney, De Cuit & Somach, to Rob Sears, Re: Public Records Act, September 15, 1997 ("Suder Files").

The DEIR states that "[d]rilling operations would occur 24 hours a day, with drill rigs being lit at night to allow for continual drilling." (DEIR, p. 2-14.) However, the load factor used in the DEIR corresponds to operation for about 8 hours a day. The standard U.S. EPA load factor for annual average operation of drill rigs is 75 percent (U.S. EPA 1991, Table 2-05), not 33 percent as assumed in the DEIR. Therefore, drill rig emissions should be revised to assume 100 percent load during the maximum hour and day and no less than 75 percent load during an average day.

This would increase all annual emissions from the drill rigs by a factor of 2.3 (75/33 = 2.3) and substantially increase annual emissions during both construction and operation as follows:[64]

	CONSTRUCTION		OPERATION	
	Table 4.13-3	Revised	Table 4.13-3	Revised
PM10	15.4	20.7	6.8	7.3
NOx	99.3	198.6	7.0	15.2
SOx	12.4	24.7	0.9	1.9
CO	42.0	84.0	2.9	6.4

This would also increase maximum hourly and maximum daily emissions from the drill rigs by a factor of 1.12 (75/67), which would increase the magnitude of the visibility impacts on Lava Beds National Monument (DEIR, Attach A to Appx. F and pp. 4-248, 4-250).

In addition to exceedances of significance criteria discussed above (Comment 5.a), the revised annual operational NOx emissions also exceed the significance criteria for the BAAQMD (15 tons/yr) and the SCAQMD (10 tons/yr). The CO emissions during the third year of construction (37 tons/qtr) also exceed the SCAQMD significance threshold of 24.75 tons/qtr, assuming 2.3 quarters per year.

Earthwork. The DEIR claims that fugitive dust emissions associated with earthwork were estimated using the U.S. EPA's total particulate emission factor of 1.2 tons/acre/month of activity. (DEIR, p. F-9.) According to the DEIR, 388.5 acres of land would be disturbed[65] AG.217

[64] The adjusted emissions were calculated using emissions in Appendix F. The year 3 drill rig emissions for NOx in Table 12, SO_2 in Table 13, CO in Table 14, and PM10 in Table 15 were multiplied by 75/33 and added to emissions from other sources.

[65] The DEIR indicates 388.5 acres of land would be disturbed by the Project. Of this amount, 310.3 acres would be cleared and 78.2 acres would only be disturbed. (DEIR, p. 4-85.) Therefore, the burning calculations use 310.3 acres, which correspond to the number of acres of vegetation removed, while the earthwork calculations are based on the total disturbed area.

(DEIR, p. 4-85), and earthwork would take place over a 2 year period (DEIR, p. F-21, Table 15 only shows earthwork in the first 2 yrs) from April to October (DEIR, pp. 2-42, 2-56). Using the DEIR's assumptions that 50 percent of this is PM10 and that dust control would reduce emissions by another 50 percent (DEIR, pp. F-9, F-10), PM10 emissions from earthwork would be about 1,600 tons over the two year period.[66] The DEIR only reports 3.4 tons from earthwork for this period. (DEIR, p. F-21, Table 15.)

The Suder Files indicate that this discrepancy is due to underestimating both disturbed area and number of days of activity. The DEIR states that the Project would remove the vegetation from and disturb 388.3 acres of land. (DEIR, p. 4-85.) The site would be cleared, grubbed, and graded. (DEIR, p. 2-34.) The emission calculations, on the other hand, assume that only 36.28 acres would be disturbed. The areas used in the emission calculations are only those within the boundaries of the new road segment right-of-ways and the well and power plant pads. The transmission line is excluded, as well as all of the emissions associated with clearing, grubbing, filling, and grading the balance of the well field and plant site, which underestimates emissions by a factor of about 11. (Suder Files, Fugitive Dust Emissions from Earthwork.)

The emission calculations also assume that emissions would be contributed only during the time when the road segment and pads are being constructed, or 14 to 42 days per road segment, 14 days per well pad, and 42 days for the power plant pad. However, other construction activities take place over the 33-month construction period (DEIR, p. 2-42) which contribute dust, including construction of the power plant, installation of the transmission line, and revegetation. In addition, the cleared, grubbed, and graded area would be a continuous source of wind-blown dust from soil erosion until it is revegetated. The DEIR's calculations of earthwork dust have ignored these sources. (Suder Files, Fugitive Dust Emissions from Earthwork.

Therefore, the DEIR substantially underestimates PM10 emissions from earthwork. These emissions should be recalculated using correct disturbed areas and construction activity times. The revised emissions would substantially increase PM10 construction emissions and result in frequent exceedance of the State 24-hour PM10 standard during Project construction.

6. Health Impacts Of The Project Are Underestimated And Significant

a. All Public Health Impacts Are Underestimated

The public health impacts of the Project are underestimated in the DEIR because they are not based on maximum concentrations at the maximally exposed individual ("MEI") receptor location (Comment 1.a), emissions were substantially underestimated by the applicant (Comments 1.c through 1.f), several highly toxic substances were omitted from the analysis AG.218

[66] Construction PM10 emissions during the first two years of construction = (388.5 ac)(1.2 tons PM/ac/mo)(14 mo)(0.5)(0.5) = 1,631.7 tons.

(Comment 1.g), and emissions from burning were omitted (Comment 4.b). These errors and omissions should be corrected, and the EIR revised and recirculated for review.

b. Acute Health Impacts Are Incorrectly Described And Are Significant

Acute health impacts must be determined by calculating the maximum 1-hour average concentration at grid points around a facility, estimating a hazard index at each grid point,[67] and then summing over all pollutants. The maximum hazard index from among all those estimated is the result of the analysis. If this maximum hazard index exceeds 1, acute health impacts are significant. (CAPCOA 1993, p. III-38.)

The DEIR performed these analyses, notwithstanding the problems documented above, and found that the hazard index was greater than 1 for respiratory irritation at two locations, Grouse Hill and Forest Service Road 49. (DEIR, p. F-48.)[68] However, instead of finding a significant impact, as is required by the CAPCOA guidelines, the DEIR mischaracterized and dismissed the impact.

Mischaracterization. The DEIR attempts to dismiss the exceedance of the acute significance criterion by claiming the index was less than 1 for only noncriteria pollutants. In fact, criteria pollutants must be included in the index if they are emitted by the facility because they contribute to acute health impacts. Then, the DEIR adds back the criteria pollutants emitted by the facility and incorrectly calls them "background." The DEIR acknowledges that this index did exceed the significance threshold, but argues that the impact would not occur because it is unlikely that all required conditions would occur at the same time. AG.219

The DEIR claims that the incremental hazard index for the Project is only 0.75 for respiratory irritation at one receptor, which is less than 1 and therefore not significant. It further claims that the hazard index only exceeds 1 after the background concentrations of criteria pollutants are added to the Project incremental index. (DEIR, p. 4-247.) This is incorrect.

Appendix F very clearly shows that the incremental hazard index for respiratory irritation is 1.2 for two receptors. (DEIR, p. F-48.) The index of 0.75 cited in the DEIR is obtained by eliminating sulfur dioxide (51.9 $\mu g/m^3$) and nitrogen dioxide (182.1 $\mu g/m^3$) from the index for

[67] The hazard index is the ratio of the estimated ambient concentration to a reference exposure level.

[68] The description of the results of the acute analysis in the DEIR, page 4-247, conflicts with the Air Quality Appendix at page F-48. The DEIR suggests that the maximum hazard index is 0.75 at Grouse Hill and that this was adjusted to 1.2 after adding background concentrations of criteria pollutants. The appendix table, on the other hand, clearly shows that the hazard index is 1.2 at two receptors before adding background concentrations. Actual hazard indices would be much larger than 1.2 after adding background concentrations and adjusting concentrations for correct emission rates. The DEIR must be revised accordingly.

the Grouse Hill receptor. This is not correct because these incremental concentrations are due to emissions from the Project and must be included in the incremental Project index. (DEIR, F-35, F-39.) These two pollutants are then erroneously called "background" concentrations and added to the 0.75 to get the 1.2 cited in the DEIR on page 4-247. (DEIR, p. F-53.)

This entire process is flawed. Two of the incremental hazard indices are equal to 1.2, not one. Nitrogen dioxide and sulfur dioxide are included in the calculation of these indices because they are emitted by the Project. (DEIR, p. F-48.) The guidelines require that when the incremental hazard index exceeds 0.5, the average background concentrations of the criteria pollutants ozone, nitrogen dioxide, sulfur dioxide, sulfates, and hydrogen sulfide must be additionally used to calculate a new hazard index, which is equal to the facility's contribution plus background (CAPCOA 1993, p. III-38). The DEIR did not report any ambient air quality data for any of these pollutants, and there are no nearby CARB ambient air quality stations where any of these pollutants have been measured.

Recalculating the Project's hazard indices using the lowest measured 24-hr sulfate concentration in 1995 (0.50 $\mu g/m^3$), which was measured at Olympic-Squaw Valley, the sulfate hazard index is 0.02 (0.5/25). Using the lowest measured 1-hr annual average concentration in 1995, 2 $\mu g/m^3$, the hazard index for nitrogen dioxide is 0.004 (2/470). Annual average sulfur dioxide is frequently zero in pristine areas and therefore is omitted from this analysis.[69] Finally, the background ozone hazard index calculated in the DEIR is 0.56. (DEIR, p. F-53.) Therefore, the total hazard index for the Project plus background is 1.78 (1.2+0.02+0.004+0.56). This hazard index is substantially higher than the significance threshold of 1 and the maximum claimed index of 1.2 in the DEIR.

In sum, the DEIR erroneously concludes that acute impacts are not significant. (DEIR, p. 4-247.) The hazard index exceeds the significance level established in the DEIR and widely used throughout California. Therefore, the impact is significant and must be mitigated. The DEIR should be revised and recirculated for public review.

Significance. The DEIR argues that a hazard index of 1 is not significant because it would occur only during unusual events. (DEIR, p. 4-247.) However, the DEIR establishes a hazard index of 1 as the significance level, without any exceptions. (DEIR, p. 4-221.) Further, this circumvents standard guidelines for performing health risk assessments, which require that health impacts be found significant when the hazard index exceeds 1. (CAPCOA 1991, p. III-39.) These guidelines do not allow any exceptions. It also deviates from standard practice throughout the field, which likewise requires that hazard indices greater than 1 be found significant. Second, the co-occurrence argument is misleading because it suggests exceedances would only occur if "a dual-turbine, bypass-unavailable plant upset occurred concurrently with the drilling of an infill well and two wells venting, worst-case meteorological conditions, and annual average ozone concentrations." A comparison of Table 4.13-6 at page 4-236 with Table AG.220

[69] CARB, California Air Quality Data. Summary of 1995 Air Quality Data, Gaseous and Particulate Pollutants, v. XXVII, 1997.

33 at page F-48 indicates that the threshold of 1 would still be exceeded for normal operation with two wells venting. Most of the emissions are actually from normal operation, not upset conditions. Further, as explained above, omitting annual average background ozone concentrations would not alter the results because the threshold is exceeded even without adding background concentrations.

The EIR should be revised to find a significant acute health impact, as required by the CAPCOA guidelines and standard practice. Mitigation should be required to eliminate this impact and the EIR recirculated for review.

7. Air Quality Mitigation Is Not Adequate

These comments indicate that the Project will have a number of significant impacts that were not identified in the DEIR. These include adverse impacts to vegetation and perhaps wildlife from the deposition of toxic metals and other substances (Comment 13), degradation of the water quality of Medicine Lake (Comment 8), adverse public health impacts (Comment 6), odor impacts (Comment 3), and degradation of air quality (Comments 3 and 4). These impacts are all caused by the emission of criteria and toxic pollutants during construction and operation. The operational impacts are primarily caused by emissions from the cooling towers and vent silencers. All of these impacts can be eliminated or greatly reduced by using standard equipment and methods, many of which are mentioned in the DEIR, but not explicitly required as mitigation. The EIR should be revised to require the mitigation identified below for these impacts and recirculated for review. AG.221

a. Mitigation Measures For Construction Impacts Are Not Adequate

The DEIR concludes that there would be significant and unavoidable impacts from construction on a short-term basis in close proximity to construction activities and required four mitigation measures. These mitigation measures include applying water or a dust palliative to all active construction areas, inactive areas with disturbed soils and soil stockpiles, limiting vehicle speeds to 25 mph on all unpaved roads, and covering all construction trucks that travel off forest roads. (DEIR, pp. 4-234, 4-235.) In addition to the impacts identified in the DEIR, first-year construction activities would result in the exceedance of the State 1-hr PM10 standard (Comment 2). These impacts have not been mitigated. AG.222

The construction mitigation proposed in the DEIR is not adequate. All feasible mitigation is required when impacts are significant and unavoidable. Both the BAAQMD (BAAQMD 1996, Table 2) and SCAQMD (SCAQMD 1993, Tables 11-2 to 11-4) have prepared CEQA guidance documents that identify feasible construction mitigation measures. The following additional technically feasible mitigation measures from these CEQA handbooks should be imposed on the Project to reduce PM10 impacts:

- Pave, apply water three times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites;

- Sweep daily with water sweepers all paved access roads, parking areas and staging areas at construction sites;
- Replant vegetation in disturbed areas as quickly as possible;
- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site;
- Install wind breaks or plant trees/vegetation wind breaks at windward side(s) of construction areas;
- Suspend excavation and grading when winds (instantaneous gusts) exceed 25 mph;
- Use methanol, natural gas, propane, or butane powered on-site mobile equipment, where available, in the order of preference listed; and
- Limit all vehicle speeds to 15 mph (rather than 25 mph recommended in the DEIR).

These additional mitigation measures for construction PM10 should be imposed on the Project to reduce significant and unavoidable PM10 air quality impacts.

b. Mitigation For The Cooling Tower Should Be Required

The emissions of arsenic, boron, hydrogen sulfide, and other constituents result in significant impacts that were not mitigated in the DEIR. These include vegetation damage from boron and other toxic pollutant emissions (Comment 13), public health impacts from consuming water and organisms from Medicine Lake contaminated with arsenic and mercury in deposition (Comment 8), odor impacts from hydrogen sulfide emissions (Comment 3), and respiratory irritation from the emission of a number of compounds, including hydrogen sulfide and ammonia (Comment 6.b). (DEIR, p. F-53.) Roughly half of the emissions of hydrogen sulfide and most of the other toxic pollutants that cause these significant impacts originate from cooling tower drift and evaporation. These emissions can be substantially reduced by using air or surface condensers, or high-efficiency drift eliminators. The DEIR must discuss and evaluate these mitigation measures. AG.223

Air-Cooled Condensers. Steam from the turbines is condensed in water-cooled, direct-contact condensers, and the condensate is cooled in a mechanically induced draft cooling tower. (DEIR, p. 2-28.) The cooling tower is the source of roughly half of the toxic emissions from the facility. (DEIR, p. F-12.) The cooling tower steam plume could be visible year round, rising up to 320 feet above the ground (tower is 70 ft tall and plume is up to 250 ft tall). (DEIR, pp. 4-139, 2-28.) Cooling tower drift and evaporation emissions and the cooling tower plume could be eliminated by replacing the water-cooled condensers and supporting cooling tower with air-

cooled condensers. This would also increase the amount of fluid reinjected into the geothermal reservoir and, thus, mitigate depletion of the resource and reduce subsidence potential.

Air-cooled condensers have been widely used in steam turbines in small power plants (1 to 50 MW) for several decades,[70] including binary geothermal power plants.[71] Air-cooled condensers alone are not practical for the dual-flash geothermal plant as currently designed by Calpine. However, they could be effectively used if the plant were modified to use Ormat's combined cycle technology. This process uses a back pressure turbine followed by energy converters operating on an organic Rankine cycle. Brine energy can be recovered in a binary plant. This process maintains the geothermal fluid above atmospheric pressure without the use of vacuum pumps or ejectors, saving power, maintenance expenses and eliminating the handling of noncondensibles. Air-cooled condensers are used, which result in a lower plant profile, reduced visual impacts, no water consumption, reduced use of chemicals, reduced emissions, and no cooling tower plumes. This allows all of the spent brine to be reinjected and facilitates hydrogen sulfide abatement. This technology has been successfully used on numerous plants on six continents that have accumulated over 10 million hours of operation.[72] It was recently used at the 125 MW Upper Mahiao geothermal power plant in the Philippines, which is the largest air-cooled plant as well as the largest geothermal combined cycle plant in the world.[73]

The EIR should be revised to require air-cooled condensers for the Project to eliminate the numerous problems associated with emissions from the cooling tower. These can be readily accommodated in a combined cycle configuration and would substantially reduce environmental impacts, reduce operating costs, increase efficiency and reliability, and avoid depleting the geothermal resource. Alternatively, high efficiency drift eliminators and a surface condenser should be required, which are discussed below.

High-Efficiency Drift Eliminators. As noted above, roughly half of the Project's toxic pollutants is emitted from the cooling tower during normal operation. Substances dissolved in the cooling water are either evaporated or emitted with the drift, which is small droplets of water created by the falling and splashing of circulating water. Virtually all of the nonvolatile constituents, such as PM10 and boron, as well as some of the volatile components, are emitted as cooling tower drift.

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[70] T.C. Elliott, Air-Cooled Condensers, Power, January 1990, pp. 13-21.

[71] A. Elovic and M. Grassiani, Air Cooled Condensers for Geothermal Power Plants, Geothermal Resources Council Trans., v. 17, 1993, pp. 355-359.

[72] Ormat, Upper Mahiao Combined Cycle Geothermal Power Plant Fact Sheet, 1996.

[73] N. Forte, The 125 MW Upper Mahiao Geothermal Power Plant, Geothermal Resources Council Transactions, vol. 20 1996, pp. 743-747; N. Forte, The 125 MW Upper Mahiao Geothermal Power Plant, Geothermal Resources Council Bulletin, August/September 1996, pp. 298-303.

It is possible to reduce the drift to a very tiny percent of the circulating water rate by using high-efficiency drift eliminators, which are baffles arranged to change the direction of air flow and catch the droplets. The DEIR does not reveal the Project's design drift rate (the percent of the circulating water flow that would be emitted as droplets) nor require any specific criteria for the proposed cooling tower. In fact, the DEIR is ambiguous on what the actual drift rate would be. It uses 0.001 percent to calculate PM10 emissions (DEIR, p. 2-29) and elsewhere states that high-efficiency drift eliminators can typically reduce drift to "less than 0.008% of the water circulation rate," (DEIR, p. F-6), but stops short of specifying a rate for this Project. The Suder Files, on the other hand, indicate that a drift fraction of 0.01 percent was used to estimate cooling tower emissions. (Suder Files, Table 5.)

Two currently proposed power plants have proposed lower drift rates than those mentioned in the DEIR. Calpine's Sutter power plant has proposed to use a drift rate of 0.0006 percent.[74] The High Desert Power Project has proposed to use a drift rate of 0.0008 percent.[75] Therefore, lower rates are clearly technically feasible. If water-cooled condensers are retained, the EIR should be modified to require that the drift eliminators be designed to achieve the lowest technically feasible drift rate (i.e., $\leq$0.0006%).

Surface Condenser. The Project proposes to use a direct-contact condenser to separate the turbine steam into condensate and noncondensible gases. The condensate is routed to the cooling tower and the noncondensible gases to the steam jet gas ejectors. (DEIR, p. 2-30.) However, a direct-contact condenser is not as efficient as a surface condenser because it leaves a larger fraction of the noncondensible gases in the condensate. The noncondensible gases that remain in the condensate can be emitted from the cooling tower. The direct-contact condenser partitions 60 to 70 percent of the hydrogen sulfide into the noncondensible gases, leaving 30 to 40 percent in the condensate where it can be emitted from the cooling tower. The surface condenser, on the other hand, partitions 85 to 90 percent of the hydrogen sulfide into the noncondensible gases, leaving only 10 to 15 percent in the condensate. (DEIR, p. 4-240.) If air-cooled condensers are not used, the EIR should require the use of surface condensers to reduce the emission of hydrogen sulfide and other volatiles, including radon, mercury, and ammonia.

c. Mitigation For Well Venting Should Be Required

During construction, wells would be vented directly to the atmosphere for 2 days to clean out the well followed by 30 days for flow testing. (DEIR, p. 2-14.) Wells are also normally vented directly to the atmosphere during maintenance, which could occur as frequently as once every year. (BPA and BLM 1995, p. 4-30.) The DEIR concludes that these emissions are not

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[74] Calpine, Sutter Power Project, Section 2.0, Project Description, Draft Application Materials Submitted to the California Energy Commissions, 1997, p. 11.

[75] High Desert Power Project, Application for Certification for High Desert Power Project, Submitted to the California Energy Commission, June 1997, p. 5.12-50.

significant because the State hydrogen sulfide standard would not be exceeded. Therefore, no mitigation is required to reduce venting emissions. (DEIR, pp. 4-235, 4-237.)

However, concentrations of hydrogen sulfide due to well venting during construction are high enough to be detected as malodors by sensitive receptors in a wide area around the facility. Malodors from hydrogen sulfide can be detected at concentrations as low as 0.4 $\mu g/m^3$. (Comment 3.) Modeled 1-hr average hydrogen sulfide concentrations exceed this threshold at numerous receptors including Medicine Lake Campground (1.0-1.7 $\mu g/m^3$), Medicine Lake Campground Headquarters (1.5-2.2 $\mu g/m^3$), Medicine Lake Cabins (1.0-1.6 $\mu g/m^3$), Little Medicine Lake (1.5-2.2 $\mu g/m^3$), Medicine Lake Glass Flow (1.8-3.2 $\mu g/m^3$), Grouse Hill (9.8-13.9 $\mu g/m^3$), Badger Peak (2.2-3.7 $\mu g/m^3$), the goshawk nest (2.1 $\mu g/m^3$), Fourmile Hill (3.5-5.9 $\mu g/m^3$), Lookout Butte (1.8-3.3 $\mu g/m^3$), the southwest corner of Lava Beds National Monument (0.5-0.9 $\mu g/m^3$), Forest Service Road 49 near the plant site (5.3-8.8 $\mu g/m^3$), the Door Knob Snowmobile Park (0.5-1.0 $\mu g/m^3$), and the Fourcorners-Medicine Lake Snowmobile Park (0.7-0.8 $\mu g/m^3$). (DEIR, p. F-44.) These receptors include many pristine areas, such as Lava Beds National Monument.

The DEIR argues odor is not a concern because humans would be infrequently present and worst-case meteorological conditions generally occur at night and in the winter when recreators are unlikely to be present. (DEIR, pp. 4-241, 4-248.) This is not correct. Individuals would be present to detect these odors in both the winter and at nights year round because there are year round residences in the area and substantial winter recreation (e.g., snowmobiling, cross-country skiing) occurs in the area. (Leydecker 1972, p. 8.)[76] Hydrogen sulfide concentrations exceed odor thresholds at several residential areas that are occupied year round, including two snowmobile parks and residential areas around Medicine Lake.

These are significant impacts that are not recognized as such in the DEIR and which should be mitigated. Although the DEIR does not include any mitigation measures to reduce hydrogen sulfide from well venting, it does require that hydrogen sulfide emissions from flow testing be monitored and reported to the SCAPCD. If measured emissions exceed SCAPCD emission limits, the SCAPCD could require mitigation, such as reduction in the number of wells venting simultaneously and implementation of wellhead treatment. (DEIR, p. 4-237, Mitigation Measure 4.13.2a.) This is not adequate mitigation.

Monitoring is not mitigation. The DEIR's own analysis (using underestimated hydrogen sulfide emissions) clearly shows that well venting during construction will cause odor problems in sensitive recreational areas around the facility. This significant impact must be mitigated by stipulating measures that will reduce hydrogen sulfide emissions below levels that would cause odor problems. The DEIR's proposed Mitigation Measure 4.13.2a only requires monitoring. It does not require any reduction in hydrogen sulfide emissions. Monitoring does not reduce

[76] U.S. Forest Service and U.S. Bureau of Land Management, Supplemented Environmental Assessment, Geothermal Leasing of National Forest System Lands in the Glass Mountain Known Geothermal Resource Area, September 1984, pp. 18 - 21.

emissions. Instead, it leaves the decision to reduce emissions to the discretion of the SCAPCD, and then only if an unspecified emission limit is exceeded. This is unacceptable.

Even if monitoring detects a problem, the mitigation imposed by the SCAPCD would not reduce impacts to insignificance. The trigger emission limit for mitigation is not specified. A preliminary list of SCAPCD permit conditions is included elsewhere and includes a proposed hydrogen sulfide limit of 10 lbs/hr during well drilling, testing, reworking, or venting. (DEIR, p. 4-219.) This is substantially larger than the emission levels that caused the significant odor impacts (1.6 lbs/hr). (DEIR, pp. F-19, Table 10.) Therefore, even if the proposed SCAPCD limit of 10 lbs/hr were adopted as mitigation, it would not reduce the odor impacts due to well venting.

Mitigation Measure 4.13.2a should be revised to require that hydrogen sulfide emissions from well venting be reduced below the odor detection threshold of 0.4 $\mu g/m^3$ at sensitive receptors. As noted in the DEIR, this could be accomplished by reducing the number of wells allowed to vent simultaneously and by requiring wellhead treatment to remove hydrogen sulfide. (DEIR, p. 4-237.) Well-head treatment could be accomplished by injecting sodium hydroxide and/or hydrogen peroxide between the flash tank and the portable silencer (DEIR, p. 4-225), using an iron catalyst secondary system (CalEnergy 1996, p. 29), or using another suitable method, as appropriate.

d. Additional Mitigation For Upset Conditions Should Be Required

During worst-case upset conditions, 100 percent of the steam flow would be vented directly to the atmosphere. Hydrogen sulfide would be removed by a secondary treatment system capable of removing 80 percent. (DEIR, p. F-8.) The ambient air quality analysis indicates that hydrogen sulfide concentrations would be high enough to cause malodors over a large area around the facility. Modeled 1-hr average hydrogen sulfide concentrations would exceed the odor detection threshold of 0.4 $\mu g/m^3$ (Hoshika et al. 1993) at numerous receptors including Medicine Mountain (1.0 $\mu g/m^3$), Medicine Lake Glass Flow (0.5 $\mu g/m^3$), Grouse Hill (16.6 $\mu g/m^3$), Badger Peak (3.9 $\mu g/m^3$), Little Mt. Hoffman (1.5 $\mu g/m^3$), the goshawk nest (0.5 $\mu g/m^3$), Fourmile Hill (8.5 $\mu g/m^3$), Lookout Butte (2.7 $\mu g/m^3$), the southwest corner of Lava Beds National Monument (0.7 $\mu g/m^3$), and Forest Service Road 49 near the plant site (5.2 $\mu g/m^3$). (DEIR, p. F-44.) These receptors include many pristine areas, such as Lava Beds National Monument. These are significant impacts that were not recognized as such in the DEIR and which have not been fully mitigated. AG.225

The only mitigation included in the DEIR is to throttle back the wells to 50 percent of full flow after 1 hour of full-flow venting. (DEIR, p. 2-41.) This is in lieu of Calpine's proposal of two-thirds of full flow over an 8 hour period after 24 hours of venting. (DEIR, p. 4-240.) Although it is stated that additional cutbacks may be required if feasible without damaging the wells to meet SCAPCD emission requirements, there is no commitment to do so, nor is any emission limit provided. (DEIR, p. 2-241.) Reducing the well flow by 50 percent would roughly halve the ambient hydrogen sulfide concentrations modeled in the DEIR and summarized above.

Remaining concentrations would still exceed the odor threshold in a number of locations. Further, actual hydrogen sulfide emissions would likely be substantially larger than those used in the DEIR modeling (Comment 1.c).

Therefore, additional mitigation is required to reduce impacts from the worst-case upset scenario to a less than significant level. This is clearly feasible. According to the Newberry DEIR, during routine upset conditions, wells would be shutdown gradually by 50 percent after 1 hour and 25 percent after 6 hours. During life-threatening emergencies, wells could be shutdown within 60 seconds, although this could cause casing collapse (BPA and BLM 1995, p. 4-30).

The DEIR should be modified to specify more stringent well shutdown requirements as additional mitigation for significant odor impacts. These should include complete shutdown of wells where feasible without damaging the well. If a life-threatening situation exists, mandatory shutdown should be required. Otherwise, flow should be cut back to 50 percent of full flow within 1 hour and to 25 percent within 6 hours. In addition, the DEIR should evaluate increasing the sulfur removal efficiency of the secondary abatement system to greater than the proposed 80 percent. The proposed sodium hydroxide/hydrogen peroxide process is capable of reducing hydrogen sulfide by 90 to 94 percent.[77]

e. Mitigation For Significant Visibility Impacts Should Be Required

The DEIR finds that Project emissions of PM10 and NOx during construction could result in a potentially significant, short-term impact on visibility within Lava Beds National Monument. The principal sources of the emissions that cause the impairment are construction PM10 and the drill rig emissions. (DEIR, p. 4-248, Appx. F.) Actual visibility impairment would be substantially larger than estimated in the DEIR because emissions from both of these sources were underestimated by substantial amounts (Comment 5.c) and burning emissions were not considered. (Comment 4.) The DEIR incorrectly suggests that these impacts would be mitigated to insignificance. As described below, the emissions used in the visibility impact analyses already include reduction due to the proposed mitigations. Therefore, these mitigation measures do not reduce visibility (or any other significant impact). The DEIR should be revised to include bona fide mitigation for the significant visibility and other impacts. AG.226

Earthwork. For PM10 emissions from earthwork, the DEIR claims that these emissions would be minimized by Mitigation Measure 4.13.1a (DEIR, p. 4-251), which is a dust control program. However, the emissions that were used in the visibility calculations assume that the dust control program was already in place. (DEIR, p. F-10.) Therefore, the emissions used in the visibility analysis already included the reductions proposed as mitigation, and the proposed mitigation measures do not reduce the projected emissions nor the visibility impact. Mitigation

[77] P. Hirtz and T. MacPhee, Development of a Safer and More Efficient Method for Abatement of H_2S during Geothermal Well Drilling, Geothermal Resources Council Transactions, v. 13, 1989, pp. 403-407.

to reduce PM10 emissions from construction is described in Comment 7.a and should be adopted in the EIR to reduce visibility and other Project impacts.

Drill Rig. For the drill rig, the DEIR recommends the use of ignition timing retard on the diesel engines used to power the drill rigs to reduce NOx emissions. (DEIR, p. 4-251.) However, the emission factors used to calculate drill rig emissions assume the engines are already controlled using ignition timing retard. (DEIR, pp. F-11, F-62.) Therefore, the emissions used in the visibility analysis already included the reductions proposed as mitigation, and the proposed mitigation measures do not reduce the projected emissions nor the visibility impact.

Peak daily and hourly emissions from the drill rigs could be reduced by simply restricting operations to a single rig at a time. During the first and second years of construction, two wells would be drilled simultaneously and during the third year, six wells would be drilled using three rigs. (DEIR, pp. F-3, F-4.) The DEIR argues that the use of only two drill rigs in the third year instead of three would not reduce total project PM10 and NOx emissions because it would only "spread out" the emissions over a longer time. (DEIR, p. F-61.) While this is true for total emissions from drilling, it is not true for hourly, daily, or even annual emissions, which would be reduced by restricting the number of rigs. Peak emissions over these shorter time periods cause significant air quality impacts, which are based on short-term exceedances of air quality standards. Spreading out the emissions, in fact, reduces these violations which are due to peak emissions. AG.227

The NOx and PM10 emissions from the rigs, the main pollutants of concern, could also be substantially reduced by requiring best available control technology ("BACT"). Air pollution control districts throughout the State have established BACT guidelines for diesel-fired internal combustion engines such as the ones that would be used on the drill rigs. In the Bay Area, technologically feasible and cost-effective BACT for NOx is an emission factor of 0.0033 lbs/hp-hr (compared to 0.013 lbs/hp-hr assumed in the DEIR), which the BAAQMD states can be achieved using selective catalytic reduction ("SCR") plus timing retard plus a turbocharger with an intercooler. BACT for PM10 is low sulfur, low ash fuel oil.[78] In the South Coast district, achieved-in-practice BACT for NOx for internal combustion engines is catalytic reduction.[79] In the San Joaquin Valley, technologically feasible BACT for NOx for internal combustion engines is selective catalytic reduction or alternatively, an LPG-fired engine with a NOx catalyst. Achieved-in-practice BACT in the San Joaquin Valley for PM10 is low-sulfur diesel fuel (0.05%

[78] BAAQMD, BACT/TBACT Workbook, Guidelines for Best Available Control Technology, June 30, 1995, p. 96.1.1.

[79] SCAQMD, Best Available Control Technology (BACT) Guidelines, February 1992, p. 96.D1.

S by weight or less) and positive crankcase ventilation or a crankcase control device that is 90 percent efficient.[80]

Therefore, NOx emissions from the drill rigs should be mitigated by using either SCR or an LPG-fired engine equipped with a NOx catalyst. The DEIR argues that SCR is too expensive, emits ammonia, and reduces power output. (DEIR, p. F-62.) However, the cost, $4,000/ton (DEIR, p. F-63), is well below $17,500/ton, which is generally considered to be economic in California. (BAAQMD 1995, p. 9.) Further, this technology is frequently permitted in California on large diesel engines,[81] and the U.S. EPA also recommends SCR for NOx control on large diesel engines without any qualifications. (AP-42, p. 3.4-4.)

Similarly, PM10 emissions from drill rigs should be mitigated by requiring diesel fuel that contains no more than 0.05 weight percent sulfur. This would also reduce sulfur dioxide emissions by a factor of four because the sulfur dioxide emissions in the DEIR are calculated assuming a sulfur content of 0.2 weight percent.[82] The DEIR must discuss and analyze these mitigation measures.

f. Proposed SCAPCD Permit Limits Are Not Adequate

The DEIR lists six conditions that "would be considered for inclusion in the ATC and PTO that Calpine would be required to obtain." (DEIR, p. 4-219.) However, the DEIR does not evaluate them and does not require that they be implemented as mitigation. Further, some of them would allow emissions far in excess of those evaluated in the DEIR and found to be significant. These conditions should be revised to reduce impacts to a less than significant levels and proposed in the EIR as mitigation measures. AG.228

The first condition would limit hydrogen sulfide "emissions from a single well during drilling, testing, reworking, or venting operation to 10 lbs/hr." (DEIR, p. 4-219.) This is a very large amount of hydrogen sulfide, far more than evaluated in the DEIR and found to cause significant impacts. As discussed in Comment 7.c, the hydrogen sulfide modeling completed for the DEIR demonstrates that emissions of 1.8 lbs/hr from two wells venting simultaneously are sufficient to result in malodors over a large area around the facility. Modeling analyses should be performed to determine the maximum hourly hydrogen sulfide emission rate that would not

[80] San Joaquin Valley Unified Air Pollution Control District, Best Available Control Technology Clearinghouse, Fourth Quarter 1996, p. 3-13.

[81] CARB, A Compilation of California BACT Determinations Received by the CAPCOA BACT Clearinghouse, 2nd Edition, November 1993; CARB, BACT Determinations Received by the CAPCOA BACT Clearinghouse During First Quarter 1997, August 7, 1997, p. 3.

[82] Sulfur content of fuel oil assumed in the DEIR = 66 lbs/day/[(0.00809 lb/hp-hr)(2550 hp)(24 hrs/day)(2 rigs)(0.33)] = 0.2%. (AP-42, p. Table 3.4-1.)

cause malodors (Comment 3). This value should be specified as a mitigation measure in the EIR and required as a permit condition.

The second condition requires control of hydrogen sulfide from well drilling, testing, reworking, or venting using abatement methods approved by the SCAPCD. The abatement methods are not identified or specified in any way. (DEIR, p. 4-220.) The SCAPCD is obligated to impose feasible mitigation that the EIR finds would reduce impacts to a less than significant level. This DEIR failed to identify any such mitigation measures. As discussed in Comment 7.c, modeling analyses should be performed to determine the maximum hydrogen sulfide emission rate from well venting that would not cause malodors. This value should be used to specify a hydrogen sulfide removal efficiency that an abatement system would have to meet. This removal efficiency should be specified as a mitigation measure in the EIR and required as a permit condition.

The fourth condition limits hydrogen sulfide emissions from the plant to 0.11 lbs/MWh. (DEIR, p. 4-220.) This is a very large amount of hydrogen sulfide, far more than evaluated in the DEIR and found to cause significant impacts. The DEIR assumes that 14,400 lbs/yr of hydrogen sulfide would be emitted by the Project. (DEIR, Table 4.13-3.) On a per megawatt-hour basis, this correspond to 0.033 lbs/MWh.[83] The emission of 0.033 lbs/MWh of hydrogen sulfide during normal operation of the Project would result in the widespread exceedance of the hydrogen sulfide odor threshold of 0.4 $\mu g/m^3$. Modeled 1-hr average hydrogen sulfide concentrations would exceed this threshold at numerous receptors including Medicine Mountain (1.0 $\mu g/m^3$), Medicine Lake Glass Flow (0.7 $\mu g/m^3$), Grouse Hill (15.7 $\mu g/m^3$), Badger Peak (3.9 $\mu g/m^3$), Little Mt. Hoffman (1.5 $\mu g/m^3$), the goshawk nest (1.8 $\mu g/m^3$), Fourmile Hill (6.3 $\mu g/m^3$), Lookout Butte (2.6 $\mu g/m^3$), the southwest corner of Lava Beds National Monument (0.5 $\mu g/m^3$), and Forest Service Road 49 near the plant site (14.7 $\mu g/m^3$). (DEIR, p. F-44.) Therefore, the proposed limit of 0.11 lbs/MWh is not suitable. Modeling analyses should be performed to determine the maximum amount of hydrogen sulfide that could be emitted during normal operation without causing malodors. This value should be specified as a mitigation measure in the EIR and required as a permit condition.

The sixth condition requires that a turbine bypass system be installed to route produced steam around the turbine to the condenser and primary abatement system during startup, shutdown, and upsets. (DEIR, p.4-220.) It is not clear whether the Project would include this system. The Project description in Section 2 does not mention a turbine bypass system. However, Section 4.3, Air Quality, discusses air quality impacts during upset conditions as though a turbine bypass system were installed. (DEIR, pp. 4-223, 4-225.) Finally, Appendix F describes emissions during plant upsets as though the Project would include a turbine bypass system. (DEIR, pp. F-7, F-8.) The EIR should be modified to require the installation of a turbine bypass system and to specify the conditions under which it would be used. This

[83] Hydrogen sulfide emission factor used in the DEIR = (14,400 lbs/yr)/(49.9 MW)(365 days/yr)(24 hr/day) = 0.033 lbs/MWh.

information should be included in the Project description in Section 2, or specified as an air quality mitigation measure in Section 4.13.

HYDROLOGY

8. Deposition Of Air Emissions On Medicine Lake Is Significant

The DEIR estimates the impact of emissions from the Project on Medicine Lake by calculating the concentration of 13 metals and sulfate in lake waters. The screening-level calculations assumed that 11.2 percent (corresponding to the percent of the time that prevailing winds blow towards the lake) of total emissions over the 45 year operating life of the Project would be deposited in the top 2 ft of Medicine Lake. (DEIR, pp. 4-35 to 4-37.) The significance of deposition was evaluated by comparing the resulting concentrations to drinking water maximum contaminant levels ("MCLs") or suggested no-adverse-response levels ("SNARLs") where MCLs were not available. (DEIR, Table 4.3-3.) The DEIR concludes that deposition would not significantly impact the water quality of Medicine Lake because all estimated concentrations were less than MCLs or SNARLs. AG.229

However, these impacts are underestimated. The DEIR does not use the correct significance standards, emissions were substantially underestimated, and the principal impact of concern, acid rain, was omitted from the analysis. These issues are discussed below in more detail. When these errors and omissions are corrected, the DEIR's screening-level analyses indicate that Project emissions would adversely affect the water quality of Medicine Lake. These impacts should either be mitigated, or the analyses should be repeated using refined analysis methodology. In either case, the EIR should be revised and recirculated for public review.

a. Arsenic Impacts Are Significant When Evaluated Using The Correct Significance Standards

Medicine Lake is both a public water supply and heavily fished by both recreators and residents who live along the shoreline. Drinking water MCLs and SNARLs should not have been relied on exclusively for evaluating the impacts of deposition on Medicine Lake. Significance levels should have included criteria for both consumption of organisms from the lake and drinking water. AG.230

First, residents and recreators who use Medicine Lake consume organisms from the lake. Many metals bioaccumulate in the foodchain and would be present at elevated concentrations in organisms exposed to deposited metals. The MCLs and SNARLs used to evaluate the deposition data do not consider bioaccumulation in the foodchain and consumption of contaminated organisms. To address this issue, the U.S. EPA has promulgated water quality criteria that apply to surface waters in California that do consider these additional factors. These criteria include human health criteria for consumption of both water and organisms and organisms only. (40 CFR 131.36(b)(1).) These criteria should also have been used to evaluate the significance of

deposition on Medicine Lake water quality because organisms from Medicine Lake are consumed.

Second, the evaluation in the DEIR indicates that the estimated concentration of arsenic, 0.012 mg/L, is close to the current arsenic MCL, 0.05 mg/L. The arsenic MCL was established in 1946 long before its carcinogenicity was recognized.[84] Today, it is widely recognized that this MCL is not stringent enough to protect human health because it does not consider the fact that arsenic is a potent human carcinogen.[85] Recent work indicates that the arsenic MCL presents a lifetime cancer risk of greater than one in a thousand (2.5×10^{-3}),[86] which is 2,500 times higher than the cancer risk threshold of 1×10^{-6} conventionally used to set MCLs. The U.S. EPA is currently conducting studies to established a more appropriate (and much lower) arsenic MCL.[87] The preparers of the DEIR should have adopted a lower threshold of significance for arsenic and supplemented their arsenic analysis. The DEIR does not contain adequate support for the high arsenic threshold.

The U.S. EPA's human health criterion for the consumption of water and organisms is 0.018 µg/L for arsenic. (40 CFR 131.36(b)(1).) This threshold is current and appropriate and should have been used. The estimated concentration of arsenic in Medicine Lake at the end of the 45-year Project life would be 12 µg/L, or over 600 times higher than the level the U.S. EPA set to protect human health. Likewise, the estimated increase in concentration in Medicine Lake from Project emissions is over 85 times higher than the U.S. EPA's human health criterion for the consumption of only organisms, which is 0.14 µg/L. Both of these criteria would be exceeded after only one year of operation of the Project. Using an out-of-date significance level is improper where a current and appropriate level of significance is available. Significant emission impacts have been masked.

In sum, the Project emissions would adversely affect the water quality of Medicine Lake and result in a significant impact to public health from the consumption of organisms and water contaminated with arsenic. Actual impacts could be substantially higher because these calculations did not consider existing ambient concentrations of arsenic in Medicine Lake. The

[84] U.S. Department of Health, Education, and Welfare, Public Health Service Drinking Water Standards, Publication No. 956, 1962, p. 26.

[85] Office of Environmental Health Hazard Assessment, Arsenic Recommended Public Health Level for Drinking Water, California Environmental Protection Agency, 1992.

[86] A.M. Fan, J.P. Brown, M.A. Milea, and P.D. Spath, Arsenic in Drinking Water: Health Effects and Regulatory Issues in California, In: W.R. Chappell, C.O. Abernathy, and C.R. Cothern (Eds.), Arsenic Exposure and Health, Science and Technology Letters, Northwood, 1994, pp. 275-284.

[87] U.S. EPA Memorandum from R. Perciasepe to Assistant and Regional Administrators, February 6, 1995.

impacts described here would be proportionately larger if arsenic emissions were higher than those calculated by the applicant and used in the DEIR. This could occur, for example, if Project emissions were underestimated (Comment 1.f), or additional units were constructed in this general area. Arsenic concentrations in geothermal fluids are typically much higher than assumed in DEIR calculations. (Layton and Anspaugh 1981.) The EIR should be revised to require mitigation for this significant impact and recirculated for public review.

b. Mercury Impacts Are Significant When Evaluated Using The Correct Emissions.

As discussed in Comment 1.e, the DEIR substantially underestimates total mercury emissions from the Project. The DEIR asserts that mercury emissions are only 0.000188 lbs/yr, even though no chemical data have been provided for the Fourmile Hill area resource. (DEIR, pp. 3-37, 3-39.) This tiny amount of mercury for a 49.9 MW geothermal plant is wholly inconsistent with a substantial body of published literature on mercury in geothermal fluids (Comment 1.e). Actual mercury emissions, based on published emission factors for geothermal power plants, are estimated to be 45 lbs/yr (Comment 1.e). Multiplying the mercury concentration in Medicine Lake estimated in the DEIR by the ratio of these emission estimates yields an average concentration of mercury in Medicine Lake of 0.09 mg/L at the end of 45 years.[88] This concentration exceeds the mercury MCL of 0.002 mg/L used in the DEIR to evaluate impacts by a factor of 45. It also exceeds the U.S. EPA water quality criteria to protect human health from the consumption of contaminated water and organisms (0.00014 mg/L) and the consumption of contaminated organisms alone (0.00015 mg/L). (40 CFR 131.36(b)(1).) AG.231

Therefore, emissions of mercury would adversely affect the water quality of Medicine Lake and result in a significant impact to public health from the consumption of organisms and water contaminated with mercury. Actual impacts could be substantially higher because these calculations did not consider existing ambient concentrations of mercury in Medicine Lake nor did they consider the fact that acid rain, discussed in Comment 8.d, may mobilize additional quantities of mercury. The EIR should be revised to require mitigation for this significant impact and recirculated for public review.

c. Boron Impacts Are Significant When Evaluated Using The Correct Emissions

As discussed in Comment 1.d, the DEIR substantially underestimates boron emissions. The DEIR claims that they are only 17.4 lbs/yr, which is wholly inconsistent with a substantial body of published literature on boron in geothermal fluids. Actual boron emissions, based on published emission factors for geothermal power plants, are estimated to be 612 lbs/yr. Multiplying the boron concentration in Medicine Lake estimated in the DEIR by the ratio of these emission estimates yields an average concentration of boron in Medicine Lake of 1.2 mg/L AG.232

[88] Revised mercury concentration in Medicine Lake at the end of 45 years = (3.9×10^{-7} mg/L)(45/0.000188) = 0.093 mg/L.

at the end of 45 years.[89] This concentration exceeds the boron SNARL of 0.6 mg/L used in the DEIR to evaluate impacts by a factor of 2.

Therefore, emissions of boron would adversely affect the water quality of Medicine Lake and result in a significant impact to public health from the consumption of water contaminated with boron. Actual impacts could be substantially higher because these calculations did not consider existing ambient concentrations of boron in Medicine Lake. The EIR should be revised to require mitigation for this significant impact and recirculated for public review.

d. Acid Deposition Impacts Were Not Evaluated And Are Significant

The principal acid gases emitted by the Project, hydrogen sulfide, nitric oxides and ammonia, form sulfuric acid and nitric acid in the atmosphere.[90] These can acidify the rain (referred to as acid rain), lakes, and soils where the acid rain is deposited if the alkalinity is low.[91] Scientists commonly use alkalinity as an index of potential sensitivity because it expresses, in part, the acid-neutralizing capacity of water bodies and, thus, their relative tolerance or potential sensitivity to acid inputs. If the alkalinity of a water body is low, the acid rain will cause the pH to drop, which results in adverse ecological impacts. The acid-neutralizing capacity of a lake buffers it against large changes in pH. Acidification occurs when a watershed receives an input of hydrogen ions that exceeds its supply of buffering ions, usually bicarbonate. Acid rain in high mountain lakes, including in the Cascades where the Project is located, has been a concern for decades because lake alkalinity is frequently too low to neutralize acid rain.[92]

AG.233

The DEIR states that "the total mass of H_2S was used to estimate SO_4 loading in the upper two feet of lake water in order to determine potential impacts to lake water pH level." (DEIR, p. 4-37.) However, the DEIR fails to present or discuss the results of any such analyses. Elsewhere, the DEIR suggests that acid rain is not a problem, presenting alkalinity measurements of 5.8 to 5.9 mg/L from U.S. Forest Service measurements (DEIR, Table 3.3-2) and characterizing them as providing "good buffering capacity." (DEIR, p. 3-15.)

[89] Revised boron concentration in Medicine Lake at the end of 45 years = (3.9×10^{-7} mg/L)(45/0.000188) = 0.093 mg/L.

[90] J.H. Seinfeld, Atmospheric Chemistry and Physical Science of Air Pollution, John Wiley & Sons, New York, 1986, Chapter 18.

[91] S.E. Manahan, Environmental Chemistry, 5th Ed., Lewis Publishers, 1991, pp. 343-344.

[92] D.H. Landers and others, Characteristics of Lakes in the Western United States. Volume I: Population Descriptions and Physico-Chemical Relationships, U.S. EPA Report EPA-600/3-86/054a, 1987; L.B. Laird, H.E. Taylor, and V.C. Kennedy, Snow Chemistry of the Cascade-Sierra Nevada Mountains, Environmental Science and Technology, v. 20, 1986, pp. 275-290.

However, this characterization is contrary to the cited data sources themselves. The 1972-73 Medicine Lake data was characterized by the author as representing "low alkalinity" and a "very poor buffer system," demonstrated by fluctuations in lake pH from slightly basic in the summer to slightly acid in the winter.[93] The author of the 1982-83 study concluded that Medicine Lake "is extremely succeptable (sic) to acid precipitation because of low buffering capacity."[94]

The alkalinity information presented in the DEIR is ambiguous because alkalinity is normally reported as mg/L as $CaCO_3$ (calcium carbonate) or as microequivalents per liter ("ueq/L").[95] Therefore, it is unclear exactly what is being reported. The original data sources are likewise ambiguous, but based on their authors' characterizations of low buffering capacity (Leydecker 1972; Jones 1983), the units are probably mg/L as $CaCO_3$. Presuming the DEIR intended mg/L as $CaCO_3$, these measurements would correspond to alkalinity values of 116 to 118 ueq/L, which are very low values and certainly do not represent "good buffering capacity."

Because of this ambiguity, the absence of recent measurements of alkalinity and any data whatsoever for the other three small lakes in the area, two samples were collected from each lake in the Medicine Lake area on September 21, 1997 and analyzed for alkalinity, conductivity, pH, and temperature. The samples were collected from the deepest portion of each lake at 5 ft below the water surface, except Blanche Lake, where the sample was collected at 0.5 ft below the surface because it is shallow. Samples were collected with a Van Dorn sampler, and sampling sites were accessed with a small inflatable rubber boat. The data are included in Attachment C. The average concentrations of alkalinity are as follows:

[93] A.O. Leydecker, Medicine Lake Water Quality Study 1971 - 72, U.S. Forest Service. Modoc National Forest, April 20, 1972, p. I-3.

[94] Richard Jones, Medicine Lake Water Quality Study 1982 and 1983, U.S. Forest Service, Modoc National Forest, 1983, p. 19.

[95] To convert alkalinity in mg/L as $CaCO_3$ to ueq/L, divide by 50 mg $CaCO_3$/meq and multiply by 1000 ueq/meq. (V.L. Snoeyink and D. Jenkins, Water Chemistry, John Wiley & Sons, New York, 1980, p. 175.)

Lake	Alkalinity (ueq/L)
Medicine Lake	152
Little Medicine Lake	242[96]
Blanche Lake	105
Bullseye Lake	137

Conductivity accounts for 93 percent of the variability in alkalinity because alkalinity is the sum of carbonate species, which are normally the predominate source of alkalinity and conductivity in low-conductivity lakes. Conductivity is frequently used to estimate alkalinity. The corresponding values of alkalinity estimated from the conductivity measurements in Attachment A are 122, 218, 77, and 115 ueq/L, respectively,[97] which are consistent with the alkalinity measurement.

Numerous studies have classified waters with alkalinities less than 200 ueq/L as moderately to extremely sensitive to long-term acidification and waters with alkalinities between 200 to 400 ueq/L as sensitive to short-term, episodic acidification.[98] Therefore, Little Medicine lake is sensitive to short-term, episodic acidification, which could occur, for example, during an upset at the proposed power plant which releases large amounts of hydrogen sulfide. Little Medicine, Blanche, and Bullseye Lakes, on the other hand, are moderately to extremely sensitive to long-term acidification and may be affected over the life of the Project. Therefore, the DEIR should have evaluated the impact of acid rain on these lakes.

Acid rain can eliminate aquatic organisms and result in major shifts in species composition by lowering the lake pH. The DEIR fails to discuss the aquatic organisms in the lakes in the Project area or provide any baseline data even though all are classified as fish habitat except Blanche Lake, which is too shallow to support a fishery. (USFS and BLM 1984, Table 6.) These lakes are stocked annually with arctic greyling and brook and rainbow trout (USFS AG.234

[96] Little Medicine Lake was covered with a thick scum of algae and foam at the time of sampling, which may have contributed to its relatively high alkalinity compared to other local lakes. This apparently is not typical, and the U.S. Forest Service was unaware of the condition or its cause. (Reed 1997.)

[97] Alkalinity (ueq/L) = 9.42C - 8.59 where C is the conductivity in microseimens/cm (Peterson et al. 1992, p. 17).

[98] J. Omernik and G. Griffith, Total Alkalinity of Surface Waters: A Map of the Western Region, U.S. EPA Report EPA-600/D-85-219, 1986; Swedish Ministry of Agriculture, Acidification Today and Tomorrow, Ministry of Agriculture, Environment Committee, Stockholm, Sweden, 1982; A.P. Altshuller and R.A. Linthurst (Eds.), The Acid Deposition Phenomenon and Its Effects, Critical Assessment Review Papers, Volume II: Effects Sciences, U.S. EPA Report 600/8-83-016 BF, 1984.

and BLM 1984, p. 18; Reed 1997), which are very sensitive to pH.[99] Acid rain also solubilizes some metal ions, particularly aluminum, copper, iron, lead, mercury and zinc, some of which are highly toxic to plants (aluminum) or aquatic organisms (aluminum, lead, mercury).[100]

The literature indicates that sulfate deposition rates in excess of 8 to 12 lbs/ac-yr are high enough to adversely affect the biota in sensitive freshwaters.[101] For example, the gills of the fathead minnow Pimephales promelas were shown to suffer damage in a lake that was experimentally acidified with 10 to 11 lbs/ac-yr of sulfate.[102]

The first state to comprehensively address acid rain was Minnesota, a state with numerous low-alkalinity lakes.[103] Based on a comprehensive review of the literature and extensive hearings,[104] Minnesota promulgated a standard to limit the amount of sulfate deposition to no more than 9 lbs/ac-yr. (Minnesota Rule 7021.0030.) The Minnesota standard is a reasonable basis for a significance standard to evaluate acid rain impacts of the Project because it is based on thorough review of the scientific evidence and extensive hearings.

According to the DEIR, 4,500 lbs/yr of sulfate from the Project from oxidation of hydrogen sulfide would be deposited on Medicine Lake (DEIR, Table 4.3-3), which has a surface area of 425 ac. (DEIR, p. 4-22.) This corresponds to a sulfate deposition rate of 10.6 lbs/ac-yr from the Project alone. Background sulfate deposition rates in the Project vicinity are unknown, but are probably about 3 lb/ac-yr based on estimates for other similar wilderness areas. (Peterson et al. 1992, Table 3.) Therefore, total sulfate deposition after the Project is operational would be about 14 lbs/ac-yr. This exceeds both the existing Minnesota acid deposition standard (9 lbs/ac-yr) and the range where scientific research has demonstrated that significant adverse impacts AG.235

[99] A.G. Heath, Water Pollution and Fish Physiology, 2nd Ed., Lewis Publishers, Boca Raton, FL, 1995, Chapter 10.

[100] O.L. Loucks and R.W. Usher, Watershed Sensitivity Measurement Strategy for Identifying Resources at Risk from Acid Deposition, U.S. EPA Report EPA-600/3-84-011, January 1984.

[101] D.W. Schindler, Effects of Acid Rain on Freshwater Ecosystems, Science, v. 239, January 1988, pp. 149-157.

[102] R.L. Leino, P. Wilkinson, J.G. Anderson, Histopathological Changes in the Gills of Pearl Dace, Semotilus margarita, and Fathead Minnows, Pimephales promelas, from Experimentally Acidified Canadian Lakes, Canadian Journal of Fishery and Aquatic Science Supplement., v. 126, no. 44, 1987.

[103] J.M. Omernik and G.E. Griffith, Total Alkalinity of Surface Waters: a Map of the Upper Midwest Region, U.S. EPA Report EPA-600/D-85-043, 1985.

[104] Minnesota Pollution Control Agency, Report of the Administrative Law Judge, Report PCA-85-002-AK, 6-2200-34-1, 1986.

occur (8-12 lbs/ac-yr). (Schindler 1988.) Therefore, sensitive lakes in the area, Medicine Lake, Bullseye Lake and Blanche Lake, could be acidified by sulfate deposition from the Project. This would adversely affect the biota in the lakes, which are popular fishing destinations. (Forest Service 1991, p. 4-211.) This is a significant impact that is not discussed in the DEIR.

Emissions of hydrogen sulfide estimated by the applicant (14,400 lbs/yr) are high enough to adversely affect sensitive lakes in Project area due to reductions in pH. Actual impacts could be substantially higher because hydrogen sulfide emissions were apparently underestimated. As discussed in Comment 1.c, actual emissions could be as high as 106,500 lbs/yr. This emission level corresponds to a deposition rate of 78 lbs/ac-yr,[105] which is six to ten times higher than the level that the literature indicates will adversely impact biota.

In addition to sulfate from the oxidation of hydrogen sulfide in the atmosphere, the Project would also emit sulfate itself from the cooling tower. Geothermal fluids in the Medicine Lake area have high concentrations of sulfate, ranging from 42 (RWQCB 1989; DEIR, Table 3.4-1) to 510 mg/L. (Mariner et al. 1993.) Using the lowest reported sulfate emission factor for geothermal plants at other sites with comparable amounts of sulfate in their geothermal fluids (0.4 lbs/MWh) (Ellis 1978), the Project could emit up to 175,000 lbs/yr of additional sulfate. The corresponding sulfate deposition rate is 46 lbs/ac-yr.[106]

Likewise, according to the DEIR, the SCAPCD is contemplating limiting hydrogen sulfide emissions to 0.11 lbs/MW-hr. (DEIR, p. 4-220.) This emission level corresponds to a deposition rate of 35 lbs/ac-yr,[107] which is three to four times higher than the levels known to adversely impact sensitive lakes and their biota.

In either case, the sulfate deposition rate would substantially exceed levels known to adversely affect biota in sensitive freshwater ecosystems, such as the lakes near the proposed Project. Actual impacts of acid rain on lakes in the area could be substantially higher than estimated using the DEIR's emissions. Total sulfate deposition could be as high as 135 lbs/ac-yr (10.6 + 78 + 46). This exceeds the significance thresholds of 8 to 12 lbs/ac-yr by a substantial amount and is a significant impact. The DEIR must be revised to evaluate the impact of acid rain on all lakes in the vicinity of the Project. The EIR must also be revised to include mitigation for this significant impact and recirculated for public review.

[105] Sulfate deposition rate if hydrogen sulfide emissions equal 106,500 lbs/yr = (10.6 lbs/ac-yr)(106,500/14,400) = 78.4 lbs/ac-yr.

[106] Sulfate deposition from sulfate emissions = (0.4 lbs/MWh)(24 hr/day)(365 day/yr)(49.9 MW)(0.112)/425 ac) = 46.1 lbs/ac-yr.

[107] Sulfate deposition rate if emissions are limited to 0.11 lbs/MW-hr = [(0.11 lbs/MW-hr)(49.9 MW)(365 days/yr)(24 hrs/day)/14,400 lbs/yr)](10.6 lbs/ac-yr) = 35.4 lbs/ac-yr.

In addition to its impacts on lakes, acid deposition is also known to adversely affect forest soils and the vegetation dependent upon it. Acid rain can acidify soils. This solubilizes metals, which can reach toxic concentrations in soil solutions. Many tree species, for example, are sensitive to the concentration of free aluminum in the soil solution, and a pH decline from 5.0 to 4.0 may increase the free aluminum concentrations by 1000 fold. Soil pH also affects nutrient availability by reducing the concentrations of calcium, magnesium, potassium, and phosphorous in solution.[108] The EIR should discuss this potential problem. AG.236

9. Water Use Would Significantly Reduce Recharge

The Project would use 21.3 million gallons ("MG") of groundwater during the three year construction period (DEIR, p. 4-22 and Table 4.3-1) and a maximum of about 1.45 million gallons of groundwater per year ("MG/yr") during operation. (DEIR, p. 4-25.) The water would be pumped from an existing well at Arnica Sink during the first year of construction (DEIR, p. 4-22) and thereafter from a well drilled into the shallow aquifer on Calpine's Fourmile Hill leases and supplemented as needed by water from Arnica Sink or other sources. (DEIR, p. 4-24.)

The DEIR evaluates the impact of this proposed water use by estimating the reduction in groundwater recharge. (DEIR, pp. 4-22 to 4-26.) Impacts were judged to be significant if pumping substantially depleted groundwater resources or interfered with groundwater recharge. (DEIR, p. 4-21.) These analyses are flawed because the DEIR uses the wrong methodology and the wrong value for the annual evaporation rate. AG.237

a. The Recharge Analyses Are Flawed

The DEIR estimated recharge by assuming that 50 percent of all precipitation is recharged and that the balance of the precipitation is evaporated. No reference is provided for this assumption. (DEIR, p. 4-22.) This is not the correct method for calculating recharge. Recharge is calculated from a water balance as follows:

$$G = P - R - ET$$

where G is groundwater recharge, P is precipitation, R is runoff, and ET is evapotranspiration.[109] Failure to use the proper methodology understates the significance of the impact.

First, the DEIR's calculation assumes that runoff is zero. While the volcanic soils in the area are porous, runoff would not be zero. The DEIR identified several intermittent streams in

[108] D. Binkley, Sensitivity of Forest Soils in the Western U.S. to Acidic Deposition, In: R.K. Olson, D. Binkley, and M. Bohm (Eds), The Response of Western Forests to Air Pollution, Springer-Verlag, New York, 1992, pp. 153-181.

[109] D.R. Maidment, Handbook of Hydrology, McGraw-Hill, Inc., 1993, p. 15-5; V.T. Chow, Handbook of Applied Hydrology, McGraw-Hill Book Co., 1964, p. 11-1.

the area from maps. (DEIR, pp. 3-28, 3-29.) Although no flow data are available, these and potentially other unidentified intermittent steams carry substantial amounts of runoff water during snowmelt and intense summer storms.[110]

Second, the DEIR assumes that evaporation in the Project area was 50 percent of annual precipitation, or about 15 inches per year ("in/yr"), because this is allegedly "a typical evaporation rate for areas with similar climate and vegetation." No support is provided for this assumption. (DEIR, p. 4-22 *et seq.*) However, potential evaporation in the area is actually about 50 in/yr, or over three times higher. Evapotranspiration from the types of vegetation in the Project area is much higher than 15 in/yr. Finally, the type of vegetation currently present is irrelevant because this vegetation will be removed during the first year of site development. (DEIR, pp. 2-34, 4-85.)

The Central Valley Regional Water Quality Control Board ("CVRWQCB"), which has issued waste discharge requirements for exploration and testing in the Glass Mountain KGRA where the Project is located, states that the evaporation rate in the Project area is 50 in/yr.[111] In addition, the California Department of Water Resources ("DWR") has measured evaporation at six stations in the general area for up to 16 years, including one station at Alturas, two stations on Davis Creek, one station at Clear Lake Dam, and two stations at Tule Lake. The evaporation rate at these stations ranges from 36.5 to 67.6 in/yr and averages 50.1 in/yr.[112]

Although all of the precipitation that falls in the area could potentially be evaporated because the evaporation rate (50 in/yr) is higher than precipitation (30 in/yr), some precipitation could escape evaporation because it would infiltrate beneath the root zone before it is evaporated or transpired by plants. This could occur during the winter and spring, when evapotranspiration and evaporation are low because some of the snowmelt infiltrates into the ground beneath the snowpack and during snowmelt. However, a study in an adjacent groundwater basin found that "[m]uch of the water from rain and melted snow that is absorbed by the soil is later returned to the atmosphere by evaporation or is consumed by vegetation."[113] There is no evidence to the contrary for the study area.

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[110] U.S. Forest Service, Land and Resource Management Plan, Modoc National Forest, 1991, p. 4-211.

[111] CVRWQCB, Waste Discharge Requirements for California Energy General Corporation and U.S. Department of Agriculture, Forest Service, Glass Mountain Geothermal Unit, Siskiyou County, Order No. 95-199, August 17, 1995, p. 2, Finding #6.

[112] California Department of Water Resources, Evaporation from Water Surfaces in California, Bulletin 73-79, November 1979, pp. 32, 33, 76.

[113] P.R. Wood, Geology and Groundwater Features of the Butte Valley Region, Siskiyou County, California, USGS Water-Supply Paper 1491, 1960, p. 58.

Finally, evapotranspiration rates for the types of the vegetation in the study area are higher than the evaporation rate assumed in the DEIR. The predominant vegetation communities in the Project area are lodgepole pine forest, mixed conifer forest, and red fir forest. (DEIR, p. 4-85.) A water balance study in mixed conifer forest with permeable soils[114] indicates that 76 percent of the total annual precipitation is evapotranspired, with the balance lost to surface runoff and recharge. In the Project area, this would be about 28 in/yr. Measurements of evapotranspiration for pine forests indicate that the evapotranspiration rate is 31.2 for an average stand of lodgepole pine[115] and ranges from 12.3 to 39.2 in/yr for Scotch pines (Pinus sylvestris).[116] The average evapotranspiration rate for these two studies is 29 in/yr.[117] If precipitation is 30 in/yr, then about 97 percent of the annual precipitation could be evapotranspired by local vegetation, not the 50 percent assumed by the DEIR. This is consistent with a water balance study on a lodgepole pine forest in Medicine Bow Mountains in Wyoming which found that up to 95 percent of the precipitation was evapotranspired.[118] In another study, it was found that evapotranspiration in stands of Douglas fir was 80 percent of the evaporation rate from a free water surface.[119]

In sum, the DEIR overestimates the amount of recharge that would occur in the Project area by underestimating evaporation and omitting surface runoff. Because the Project impact is estimated as the percent of the total recharge that is pumped, the DEIR underestimates the impact of groundwater pumping on recharge. As discussed below, these impacts are significant.

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[114] P. Greminger, Physical and Ecological Studies on the Water Flow Pattern in a Fairly Permeable Soil on a Slope Under Vegetation, Eidgenoessische Anstalt Fuer das Forstliche Versuchswesen Mitteilungen, v. 60, no. 2, 1984, pp. 151-301.

[115] D.H. Knight, T.J. Fahey, S.W. Running, A.T. Harrison, and L.L. Wallace, Transpiration from 100-yr-old Lodgepole Pine Forests Estimated with Whole-Tree Potometers, Ecology, v. 62, no. 3, 1981, pp. 717-726. This paper reports an average daily evaporation rate of 0.33 cm/day for an average stand. Assuming an 8 month growing season from March to October, the total annual evapotranspiration rate would be (0.33 in/day)(240 days)/(2.54 cm/in) = 31.2 in/yr.

[116] M.R. Petersen and R.W. Hill, Evapotranspiration of Small Conifers, Journal of Irrigation and Drainage Engineering, v. 111, no. 4, 1985, pp. 341-351. The evapotranspiration rate measured in three separate lysimeters was 39.2, 32.4, and 12.3 in/yr.

[117] The average measured evapotranspiration rate for pines is (31.2 + 39.2 + 32.4 + 12.3)/4 = 28.8 in/yr.

[118] D.H. Knight, T.J. Fahey, and S.W. Running, Water and Nutrient Outflow from Contrasting Lodgepole Pine Forests in Wyoming, Ecological Monographs, v. 55, no. 1, 1985, pp. 29-48.

[119] T.A. Black, Evapotranspiration of Douglas Fir Stands Exposed to Soil Water Deficit, Water Resources Research, v. 15, no. 1, 1979, pp. 164-171.

b. The Project Would Significantly Reduce Recharge In Arnica Sink

The Project would pump 6.9 MG[120] of water from an existing well in Arnica Sink during the first year of construction. According to the Forest Service, this well is actually south of Arnica Sink, in a lodgepole pine forest.[121] The DEIR estimates that recharge in the Arnica Sink area is 80 MG/yr, assuming that 50 percent of the annual precipitation of 30 in/yr falling on the 200-acre Sink is evaporated.[122] Because the Project would use only about 8.5 percent of the estimated recharge, the DEIR concludes that the impact is not significant. (DEIR, p. 4-22.)

The DEIR's calculations overestimate recharge by assuming that only one-half of the precipitation is evaporated. In fact, as demonstrated above, the potential evaporation rate in the area is greater than precipitation. Therefore, essentially all of the precipitation falling in the Arnica Sink could potentially be evaporated, depending upon its timing, ground cover, and climate. Thus, unless there are substantial subsurface flows into the area, for which there is no evidence, Project pumping would not be replenished and the groundwater table would decline. AG.238

The presence of vegetation would reduce potential evaporation through canopy shading and other physical modifications of the ground surface. According to the DEIR, the vegetation in the Arnica Sink area is lodgepole pine forest and herbaceous cover. (DEIR, Fig. 3.7-2, p. 3-84.) The Forest Service indicates that the Sink itself is a large barren pumice flat that is about 40 acres in size and barren except for scattered forbes, grasses, and other herbaceous vegetation. The surrounding area, where the well is located, is lodgepole pine forest. (Reed 9/23/97.) The average evapotranspiration rate for lodgepole pine forest, as discussed above, is 29 in/yr. Conservatively assuming that there is no runoff, the recharge would be 5.4 MG.[123] Therefore, groundwater pumping during the first year of construction would remove essentially all of the local recharge and draw down the water table.

Either of these scenarios would more than offset local recharge. This is a significant impact based on the significance criteria in the DEIR. (DEIR, p. 4-21.)

In addition, Project pumping could potentially lower water levels in nearby wells. According to the Forest Service, there is a second water supply well about 300 ft from the AG.239

[120] The DEIR states that the amount pumped is 6.6 MG in the second paragraph on page 4-22, 6.9 MG in the third paragraph on page 4-22, and 6.9 MG in Table 4.3-1. I have assumed that 6.9 MG is the correct value.

[121] Personal communication, Brad Reed, District Resource Officer, Doublehead Ranger District, Tulelake, CA (916-667-2246), September 22, 1997.

[122] DEIR Recharge = (200 ac)(30 in/yr)(ft/12 in)(3.259x10^5 gal/ac-ft) = 81.5 MG/yr.

[123] Revised Recharge in Arnica Sink = (200 ac)(30-29) in/yr)(ft/12 in)(3.259x10^5 gal/ac-ft) = 5.4 MG/yr.

Calpine well which is used by geothermal companies for exploratory drilling and by the Forest Service and others for road watering. (Reed 9/23/97.) Further, there are four other nearby wells within about 1 mi of the Sink. (DEIR, Fig. 3.3-3, Wells 11-14.) Therefore, pumping during the first year of construction could adversely affect the yield of nearby wells and/or increase pumping costs. This is also a significant impact that is not discussed in the DEIR.

In sum, the impact of first year pumping from the Arnica Sink well is significant and must be mitigated. A possible mitigation measure would be to require that the first year construction water supply be obtained from an on-site well that is hydraulically isolated from the Medicine Lake area. Although the local water table would still decline, other water supply wells would be at greater distances and drawdown impacts would probably be less severe. Further, other local mitigation measures, as discussed below, could be implemented. AG.240

c. The Project Would Significantly Reduce Recharge At The Project Site

The Project would pump 5.9 MG of water during the second year of construction and 8.5 MG of water during the third year of construction. Thereafter, the Project would pump 650,000 gal/yr for domestic purposes and 800,000 gal/yr every second year for drilling of one infill production well. All of this water would be pumped from an unlocated well on the Calpine lease. (DEIR, p. 4-24, 4-25.) Over the 45 year life of the Project, a total of 58 MG of water would be extracted from the shallow groundwater basin in the Mt. Dome/Klamath Lake basin where the Project is located.[124]

The DEIR concludes that this is not a significant impact because it represents a small percent of the total recharge in the Mt. Dome/Klamath Lake groundwater basin. However, the DEIR fails to quantify the total basin recharge. Therefore, it is not possible to determine the actual percentage of the total recharge that would be withdrawn and to evaluate its significance. AG.241

The DEIR argues instead that at most, the recharge from only 21 acres would be required to supply 8.5 MG of water, assuming that 50 percent of all precipitation is recharged and the balance is evaporated. This is wrong because it uses the wrong evaporation rate and it assumes that the Project site is forested. The location of the proposed well is unknown. However, assuming the area that supplies the recharge is forested with pine, the evapotranspiration rate for pine forest is 29 in/yr, not 15 in/yr as assumed in the DEIR analysis. Repeating the DEIR's analysis using 29 in/yr yields 313 acres,[125] or about 15 times more area than calculated in the DEIR. This is a large area and represents a significant impact.

[124] Total groundwater pumped from Calpine well = (650,000 gal/yr)(42 yr) + (800,000 gal/yr)(21 yrs) + 5,900,000 gal + 8,500,000 gal = 58.5 MG.

[125] Recharge area required to supply 8.5 MG of water annually = (8.5 x 10^6 gal/yr)/[(3.259 x 10^5 gal/ac-ft)(30-29 in/yr)(ft/12 in)] = 313 ac.

However, the Project site itself where the well would probably be located, would not be forested at all. Construction of the Project would eliminate vegetation on the Project site during the first year of construction. (DEIR, p. 2-34.) The DEIR indicates that 177.3 acres at the power plant and well site would be altered by the removal of vegetation and soils, compaction of earth material, paving, and construction of buildings. (DEIR, p. 4-28.) This would increase rates and/or quantities of surface runoff. (DEIR, p. 4-27.) The surface runoff from these alterations would be stored in well pad sumps or injected into the geothermal system. Snow would be placed directly into the cooling tower basin, be allowed to melt, and piped with the injection fluids into the geothermal reservoir. (DEIR, p. 2-35.) Therefore, much of the precipitation that may have recharged the groundwater at the site prior to development, if any, would be captured and removed from the system by injection into the geothermal system or by evaporation from the cooling tower and sumps. Thus, the 62 MG of water pumped from the Calpine well would not be replenished by local recharge and would result in lowering the water table. This is a significant impact.

The water supply well for Lava Beds National Monument is located about 6 miles northeast of Calpine's Fourmile Hill leases. The DEIR concedes that shallow groundwater from the eastern portion of these leases may partially recharge this well (DEIR, p. 4-25), which is downgradient from the Project site. (DEIR, Fig. 3.3-3.) Thus, the removal of 62 MG of water from this aquifer, which would not be recharged as explained above, could adversely affect this well by lowering the water table, increasing pumping costs and perhaps degrading water quality. The DEIR did not evaluate this important impact, which may be significant. AG.242

In sum, the Project would significantly reduce recharge in the Project area and may reduce the water supply available to the Lava Beds National Monument. The DEIR should be revised to require that local recharge impacts be mitigated. One possibility is to require that the local aquifer be artificially recharged with captured surface runoff, rather than injecting it into the geothermal system or evaporating it in the cooling tower. Depending upon the quality of the captured water, it could be treated prior to recharge, as appropriate. The DEIR should also be revised to include specific calculations on the effect of Project pumping on the water supply of Lava Beds National Monument. If this impact is significant, it must also be mitigated.

10. Water Use Would Result In A Significant Impact On Local Surface Waters

The lakes in the area are primarily fed through groundwater seepage and a small contribution from springs in the area. (Leydecker 1972, p. 1.)[126] Because the local groundwaters and springs may be hydraulically connected with Arnica Sink (DEIR, pp. 4-22, 4-23), pumping from the Arnica Sink well may reduce the groundwater discharge to lakes in the area. AG.243

[126] The DEIR incorrectly claims that Medicine Lake is fed primarily by emergent springs, citing USFS 1972. (DEIR, p. 3-20.) However, this reference states Medicine Lake is primarily fed through ground water. (Leydecker 1973, p. 1.)

The DEIR evaluates the impact of the proposed water use discussed above by estimating the reduction in the amount of water in Medicine Lake. (DEIR, pp. 4-22 to 4-26.) Impacts are judged to be significant if pumping substantially changes the amount of water. (DEIR, p. 4-21.) These analyses are flawed because the DEIR uses the wrong methodology and the wrong value for the annual evaporation rate. The DEIR also fails to evaluate the impact of pumping on other smaller lakes and springs in the area.

The DEIR evaluates the impact of pumping from the well in Arnica Sink on Medicine Lake recharge by estimating the percent of the total net precipitation falling on the 425-ac lake that would be exported to the Project site. The DEIR estimates that the annual recharge to the lake is 258 MG[127] and that the Project would potentially remove 6.9 MG or 2.5 percent of this, which the DEIR concludes would not significantly affect lake levels. (DEIR, p. 4-22.)

Recharge to the lake is actually greater than estimated in the DEIR.[128] Recharge to a lake is normally estimated from a water balance around the lake as follows:[129]

$$R = O + E - P$$

where R is recharge or inflow to the lake from surface runoff, springs, and groundwater seepage; P is precipitation falling on the lake; E is evaporation from the lake surface; and O is outflow from the lake due to seepage and surface water flows. The DEIR ignores the outflow component, which is about 5 ft/yr of seepage through the bottom of Medicine Lake (693 MG) (Schneider and McFarland 1996, p. 12), and uses the wrong value for evaporation.

As discussed in Comment 9.a, the DEIR erroneously assumes that evaporation from a lake surface is only 15 in/yr. Evaporation is measured using Class A pans. Evaporation from a lake surface can be assumed to be about 70 percent of the pan evaporation (Chow 1964, p. 11-7),

[127] Annual recharge to Medicine Lake = (425 ac)(15 in/yr)(ft/12 in)(3.259 x 10^5 gal/ac-ft)/10^6 gal/MG = 173.1 MG. The DEIR reports that the recharge is 258 MG (DEIR, p. 4-22). However, there is apparently an error in the DEIR calculations.

[128] The DEIR estimates that pumping would reduce recharge to Medicine Lake by 2.5 percent (DEIR, p. 4-22), which is an overestimate. Recharge to Medicine Lake = E + O - P = (425 ac)(3.259x10^5 gal/ac-ft)(5 ft/yr) = 692.5 MG. (The USGS observed in 1992 that the lake level dropped 5 ft between June and September, which would be approximately equal to E + O - P for this period. Comparable declines, amounting to about 1 ft/mo, were also reported by the USFS in 1982 and 1983 (Jones 1983, Fig. 8).) Therefore, recharge to the lake is 693 MG/yr and the Project could reduce recharge to the Lake by 6.9 MG or up to about 1 percent. Spring discharge to Medicine Lake would also be reduced. Cumulative impacts from this and other projects may be significant.

[129] L.L. Hubbard, Water Budget of Upper Klamath Lake, Southwestern Oregon, USGS Hydrologic Investigations Atlas HA-351, 1970.

which is 50 in/yr in the Medicine Lake area as discussed in Comment 9. Therefore, lake evaporation would be 35 in/yr. Alternatively, the Forest Service estimates that in the Project area, annual evaporation from a Class A pan is between 60 and 65 inches and that lakes lose 73 to 74 percent as much as a Class A pan, making annual evaporation from lakes around 45 inches.[130] Because average annual precipitation is only 30 in/yr, more water is evaporated from lakes in this area than falls on them as precipitation.

The DEIR's procedure, modified as described above, is used to evaluate impacts of pumping on small lakes and springs in the Medicine Lake area. For each water body, it is assumed that the entire amount of pumpage would come from groundwater that would otherwise recharge that water body, following the DEIR's procedure. This overestimates actual impacts, which would be spread out among all lakes and springs simultaneously. However, this procedure ignores the impacts of cumulative pumping from the Project and other nearby projects, underestimating impacts. CalEnergy has proposed to build a 48 MW geothermal plant at Telephone Flat, and exploration occurs in the area. Cumulative impacts would also be significant and should be evaluated by the EIR.

a. The Project Would Significantly Reduce Recharge To Little Medicine Lake

The DEIR concedes that withdrawal of water from Arnica Sink could reduce the recharge to Little Medicine Lake, but concludes that the impact is insignificant without performing any analyses. (DEIR, p. 4-23.)

The area of Little Medicine Lake is about 2.4 acres, based on planimetering the USGS 7.5 minute Medicine Lake quadrangle.[131] According to the USGS survey in the area in 1992, the lake level remained fairly constant between June and September 1992. (Schneider and McFarland 1996, p. 12.) Because there is no surface inflow or outflow (USGS 1993), this suggests that seepage from the lake is probably zero and that the lake is fed by subsurface seepage. Therefore, outflow is zero, and seepage into the lake is approximately equal to evaporation minus precipitation, which is 325,900 gal/yr.[132]

AG.244

The Project would remove 6.9 MG of groundwater from Arnica Sink, which is 21 times larger than the estimated recharge rate of Little Medicine Lake. If the 325,900 gal/yr of

[130] U.S. Department of Agriculture, Forest Service and Soil Conservation Service, Soil Survey of Modoc National Forest Area, California, 1983, p. 5.

[131] USGS, Medicine Lake, Calif., 7.5 Minute Series (Topographic), 1993.

[132] Recharge to Little Medicine Lake = (2.4 ac)(ft/12 in)(3.259x10^5 gal/ac-ft)[(50 in/yr)(0.7) - 30 in/yr] = 325,900 gal/yr.

subsurface seepage were totally eliminated, the level of the lake would drop about 0.4 feet[133] during the first year of construction. If 6.9 MG were removed from the lake, the lake level would drop about 9 feet. Because the depth of the lake ranges from 10 feet in most locations, up to 25 feet (Schneider and McFarland 1996, p. 9), the lake would be nearly dried up over much of its area. Based on the DEIR significance criteria, which classifies changes in the amount of water in any surface water body as significant (DEIR, p. 4-21), the Project would result in a significant impact to Little Medicine Lake.

The DEIR should be modified to evaluate this impact using correct methodology. The impact is significant and should be mitigated by prohibiting pumping from the Arnica Sink well.

b. The Project Would Significantly Reduce Recharge To Other Lakes In The Area

Two other small lakes, Blanche Lake and Bullseye Lake, are present about 2 mi south of the Arnica Sink well. (DEIR, p. 3-20; USGS 1993.) These lakes are popular recreational areas. (Forest Service 1991, p. 4-211.) The DEIR concedes that withdrawal of water from the Arnica Sink well could reduce the recharge to other surface water bodies in the area, but concluded the impact would be insignificant without performing any analyses.

Bullseye Lake. The area of Bullseye Lake is about 5.3 acres, based on planimetering the USGS 7.5 minute Medicine Lake quadrangle. (USGS 1993.) According to the USGS survey in the area in 1992, the lake level dropped several feet between June and September 1992, suggesting water may discharge through the lake bottom. (Schneider and McFarland 1996, p. 12.) Because there is no surface inflow or outflow (USGS 1993), and evaporation is greater than precipitation, the lake is probably recharged by subsurface groundwater seepage. Assuming that the lake level dropped 5 feet, which was the largest reported decline in the area, lake recharge would be 8.6 MG/yr.[134]

AG.245

The Project would remove 6.9 MG of water from the Arnica Sink area during the first year of construction, and additional, presumably smaller amounts, in subsequent years to supplement the supply from an on-site Calpine well. (DEIR, p. 4-24.) Therefore, the Project could potentially remove up to 80 percent of the recharge to Bullseye Lake. If the 6.9 MG of recharge were totally eliminated, the level of the lake would drop about 4 feet,[135] or be lowered by half or more since the maximum depth of the lake is only 8.2 ft. (Schneider and McFarland 1996, p. 9.) Based on the DEIR significance criteria, which classify changes in the amount of water in any surface body as significant (DEIR, p. 4-21), the Project would result in a significant

[133] Drop in level of Little Medicine Lake if 325,900 gal of recharge is eliminated = (325,900 gal)/(2.4 ac)(325,900 gal/ac-ft) = 0.4 ft.

[134] Recharge to Bullseye Lake = (5.3 ac)(3.259x10^5 gal/ac-ft)(5 ft/yr)/10^6 gal/MG = 8.6 MG.

[135] Drop in level of Bullseye Lake if 6.9 MG of recharge is eliminated = (6.9 MG)/(5.3 ac)(325,900 gal/ac-ft) = 3.99 ft.

impact to Bullseye Lake. Actual impacts could be much larger than presented here because the decline in lake level is probably less than 5 feet. Because recharge in this case is equal to the lake area multiplied by the decline in the water table, a smaller decline would lower the estimated amount of recharge and increase the relative fraction removed by the Project. This impact should be mitigated by prohibiting pumping from the Arnica Sink well.

Blanche Lake. The area of Blanche Lake is about 1.7 acres, based on planimetering the USGS 7.5 minute Medicine Lake quadrangle. (USGS 1993.) According to the USGS survey in the area in 1992, the lake level dropped several feet between June and September 1992, suggesting water may discharge through the lake bottom. (Schneider and McFarland 1996, p. 12.) Because there is no surface inflow or outflow (USGS 1993), and evaporation is greater than precipitation, the lake is probably recharged by subsurface groundwater seepage. Assuming that the lake level dropped 5 feet, which was the largest reported decline in the area, lake recharge would be 2.8 MG gal/yr.[136]

The Project would remove 6.9 MG of water from the Arnica Sink area during the first year of construction, and additional, presumably smaller amounts, in subsequent years to supplement the supply from an on-site Calpine well. (DEIR, p. 4-24.) Therefore, the Project could potentially remove virtually all of the recharge to Blanche Lake. If 2.8 MG of recharge were totally eliminated, the level of the lake would drop about 5 feet.[137] Because this is a shallow lake (Schneider and McFarland 1996, p. 9), Project pumping could dry it up. Based on the DEIR significance criteria, which classifies changes in the amount of water in any surface body as significant (DEIR, p. 4-21), the Project would result in a significant impact to Blanche Lake. This impact should be mitigated by prohibiting pumping from the Arnica Sink well.

c. The Project Would Significantly Reduce Spring Flows

The DEIR indicates that there are five springs within 5 miles of the power plant, wellfield, and Arnica Sink well. (DEIR, p. 3-20.) Crystal Springs is the water supply for the Forest Service guard station on the west end of Medicine Lake and to cabins west of Little Medicine Lake. Paynes Springs I and II are occasionally used for water supply for campers and horses. (Schneider and McFarland 1996, p. 8.) Because these springs may be hydraulically connected with Arnica Sink (DEIR, p. 4-24), pumping from the Arnica Sink well may reduce spring discharge. AG.246

The DEIR does not explicitly evaluate the impact of the Project on these nearby springs, although it concedes that withdrawal of water from Arnica Sink could reduce recharge to "other water bodies in the project vicinity." (DEIR, p. 4-23.) Instead, it evaluates the impact of the

[136] Recharge to Blanche Lake = (1.7 ac)(3.259x10^5 gal/ac-ft)(5 ft/yr) = 2.77 MG/yr.

[137] Drop in level of Blanche Lake if 2.8 MG of recharge is eliminated = (2,800,000 gal)/(1.7 ac)(325,900 gal/ac-ft)/10^6 gal/MG = 5.05 ft.

Project on the Fall River springs, which are about 30 miles south of the Arnica Sink well. (DEIR, p. 4-24.)

The DEIR evaluates the impact of the Project on the Fall River springs by estimating the percent of the spring discharge that would potentially be reduced by Project pumping. This same approach is used below for springs in the Project area. The USGS reported measurements of spring discharge in 1992. (Schneider and McFarland 1996, Table 2.)

The discharge of Crystal Springs, which is an important water supply spring, is a constant 3.4 gal/min year round, based on reports by Forest Service personnel who rely on the well. Therefore, the total annual discharge is 1.8 MG/yr.[138] Because the Project would withdraw up to 6.9 MG from the local aquifer, the Project could potentially dry up this spring during the first year of construction. This is a significant impact.

The discharge from the Latunich Spring is 15.1 MG/yr (28.7 gal/min). Project pumping could reduce this discharge by up to 46 percent. The discharge of Paynes Spring I is 39.6 MG/yr, and Project pumping could reduce it by up to 17 percent. The discharge of Paynes Spring II is 12.2 MG/yr, and Project pumping could reduce it by up to 57 percent during the first year of construction.

These are substantial reductions and are significant impacts. This impact should be mitigated by prohibiting pumping from the Arnica Sink well.

11. Power Production May Adversely Affect Water Resources

The production of 49.9 MW of power would require the removal of 2.9 million pounds per hour ("Mlb/hr") of fluid from the geothermal reservoir and the reinjection of 2.425 Mlb/hr. (DEIR, Table 4.4-1.) Therefore, 501 MG[139] of water would be removed from the geothermal reservoir every year and 23,000 MG would be removed over the 45 year life of the Project. This is a substantial amount of water. The DEIR argues that this would have no impact on local water resources because there are no known connections between the geothermal reservoir and local thermal sources (DEIR, pp. 3-36, 4-49) and the overlying groundwater aquifer. (DEIR, p. 4-33.) AG.247

However, this conclusion is pure speculation. There are no data whatsoever to support it. For example, the DEIR states that "[s]hallow groundwater within the caldera is probably separated from the shallow groundwater outside the caldera...the geothermal system is probably recharged from deep groundwater recharge...it is probable that if there is significant recharge..." (DEIR, p. 3-41, underlining added.) "[T]here appears to be no connection between the shallow

[138] Annual discharge of Crystal Spring = (3.4 gal/min)(60 min/hr)(24 hr/day)(365 day/yr) = 1,787,040 gal/yr.

[139] Amount of water removed from geothermal reservoir = (0.475 Mlb/hr)(24 hr/day)(365 day/yr)/(8.3 lbs/hr) = 501.3 MG/yr.

groundwater and the geothermal system." (DEIR, p. 4-33.) "The geothermal reservoir is not believed to be connected to regional groundwater systems." (DEIR, p. 4-316.) No boring logs or published field investigations are cited to support any of these claims.

Three letters from the Fall River Resource Conservation District in RWQCB files present evidence that contradict this speculation. These letters, citing work by the USGS, Lawrence Livermore National Laboratory, and the Colorado School of Mines, claim that there are active high-angle fault zones between the geothermal reservoirs and shallow groundwaters and springs. High-pressure production activities could stimulate fluid movement along these fractions and open new fractures.[140] Further, the presence of two fumaroles in the Medicine Lake area that emit steam and gases along fracture intersections (DEIR, p. 3-35) clearly demonstrate that there are connections between the geothermal resource and the upper aquifers in the Medicine Lake area.

Connections among these sources could degrade the quality of springs if high salinity reservoir fluids seeped into freshwater springs. Further, to the extent that the geothermal reservoir recharges local thermal springs, such as those in the Butte Valley and Fall River areas (DEIR, p. 3-36), the discharge from these springs could be substantially reduced. These impacts could be aggravated by other projects in the area, such as the recently proposed CalEnergy Telephone Flat 48 MW geothermal power plant.

The DEIR must provide data to support its position that fluid extraction and injection would not impact the quality and quantity of local shallow groundwaters and springs. Otherwise, the impact should be qualitatively assessed and found to be tentatively significant based on the information cited in the Fall River correspondence. An investigation should be required to develop the data to quantitatively evaluate the impacts and to propose suitable mitigation, as appropriate.

12. Brine Spills Would Result In Significant Impacts

The DEIR discusses the impacts from chemical and hazardous material spills on water quality. (DEIR, p. 4-39.) However, it fails to comprehensively discuss the impact of the largest single hazardous material at the site, the brine itself. The Human Health and Safety section considers well blowouts, which are one type of accident that could result in a brine spill, but concludes they are not significant because the Project includes blowout prevention equipment on each production well and a 750,000 gallon sump to contain any losses. (DEIR, pp. 2-15, 4-282, 4-283.)

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[140] Letter from Rick Poore, Fall River Resource Conservation District, to Randy Sharp, USFWS, February 18, 1997; Letter from Rick Poore, Fall River Conservation District, Thomas Grose, Colorado School of Mines, and Maria Ellis, University of Michigan, to Randy Sharp, USFWS, June 4, 1997; Letter from Rick Poore, Fall River Conservation District, Thomas Grose, Colorado School of Mines, and Maria Ellis, University of Michigan, to Randy Sharp, USFWS, August 4, 1994.

However, brine spills at other locations, including piping between wells and the power plant and at the power plant itself are possible because of the highly corrosive nature of the brines, which can cause pipeline and other failure, and the high pressures in the pipelines.[141] Because geothermal brines contain high concentrations of toxic and hazardous substances, including hydrogen sulfide and metals, they can adversely affect local soils, groundwaters, and exposed workers if not properly contained.[142]

According to the DEIR, the Project would process 2.9 million pounds of geothermal water per hour. (DEIR, p. 4-44.) Assuming the fluid weighs 8.3 lbs/gal, the density of water, and that the entire fluid flow of the plant discharged, about 350,000 gallons of brine could be discharged to the ground in 1 hour.[143] This is comparable to other estimates of the size of a typical spill. (Layton and Morris, 1981, p. 64.) According to the published literature, this would result in the dissolution of large amounts of chloride, lead, boron, copper, and zinc from local soils, which could contaminate underlying aquifers. (Shinn and Ireland 1981.)[144] Further, it could take 3 to 10 years to reclaim the soils by leaching.[145]

This is a significant impact that is not revealed in the DEIR. The DEIR should be revised to quantitatively evaluate the impact of a brine spill on groundwater quality and to recommend mitigation. Mitigation would include constructing containment berms along pipeline corridors and at the power plant. Pressure activated alarms could also be used to alert plant operators so that remedial actions could be promptly taken.[146]

[141] J.H. Shinn and R.R. Ireland, Ecology Problems Associated with Geothermal Development in California, Symposium on Energy and Ecology in the West, Lawrence Livermore Laboratory Report UCRL-83941, Revision 1, August 4, 1980.

[142] D.W. Layton and W.F. Morris, Geothermal Power: Accidental Fluid Releases and Waste Disposal, CEP, April 1981, pp. 62-67.

[143] Amount of brine discharged = $(2.9 \times 10^6$ lbs/hr)(1 hr)/(8.3 lbs/gal) = 349,398 gal.

[144] G. Sposito, A.L. Page, and S.V. Mattigod, Trace Metal Speciation in Saline Waters Affected by Geothermal Brines, Lawrence Livermore National Laboratory Report UCRL-15072, 1979.

[145] W.A. Jury and L.V. Weeks, Solute Travel Time Estimates for Tile Drained Fields, III. Removal of a Geothermal Brine Spill from Soil by Leaching, Lawrence Livermore National Laboratory Report UCRL-13792.

[146] R. Sung, Surface Containment for Geothermal Brines, TRW, Inc. Report, Redondo Beach, Calif., 1979.

VEGETATION

13. **Toxic Metal Deposition Would Significantly Impact Local Vegetation**

a. Boron Deposition Would Significantly Impact Local Vegetation

The DEIR estimates the impact of boron emissions from the cooling tower on downwind vegetation. The DEIR analysis relies on a study performed by PG&E at The Geysers ("Malloch Study").[147] This initial study was followed by two years of additional investigation, which was published in the open literature. In the followup study, boron deposition rates and concentrations in soil saturation extracts and vegetation downwind of two plants, Unit 5-6 and Unit 13, were related to vegetation conditions ("Lang Study").[148] Based on the Malloch Study, the DEIR concludes that boron emissions would not adversely impact vegetation because the estimated maximum boron deposition for the Project is comparable to or somewhat less than that measured at Unit 13, where the vegetation exhibited no symptoms of boron toxicity. (DEIR, pp. 4-91 to 4-92.) However, the followup study shows that this conclusion is incorrect. Vegetation near Unit 5-6 was damaged more because Unit 5-6 had been operating longer and because there were more sources of boron nearby. The DEIR fails to acknowledge these facts. The DEIR should apply the results of the follow-up study, instead of relying on incomplete and outdated information.

Operating History. The DEIR claims, based on the Malloch Study, that "although elevated concentrations of boron were found in plant tissues near the cooling towers, no visible symptoms of boron toxicity were found, and the leaves of mixed conifer forest surrounding the power plant unit did not exhibit symptoms of boron toxicity. A similar pattern of increased concentrations of boron is expected to occur in the leaf tissue of vegetation near the proposed power plant site. Although conifers in the vicinity of the power plant may accumulate boron to some extent, the levels would not be expected to affect the health of these species, and no visible effects to this vegetation are expected." (DEIR, p. 4-92.)

This is misleading. The Lang Study investigated two units at The Geysers. Vegetation downwind from one of these, Unit 5-6, had substantial damage, while vegetation downwind of the second, Unit 13, indeed had no visible damage. However, at the time that this study was done, Unit 13 had only been in operation for 2.3 years, while Unit 5-6 had been in operation for 10.3 years. The study explained that the reasons for the differences in vegetation damage were due not only to differences in emissions, but also "to the shorter operating history of Unit 13 compared to Unit 5-6." (Lang Study, p. 262.) The Project would operate for 45 years, allowing substantial amounts of boron to accumulate in downwind soils and vegetation. Therefore, the

[147] B.S. Malloch, M.K. Eaton, and N.L. Crane, Assessment of Vegetation Stress and Damage near The Geysers Power Plant Units, PG&E Research Report 420-79-3, San Ramon, CA, 1979.

[148] F.J. Lang, F.T. Bingham, F.F. Hendrix, and N.L. Crane, Boron deposition on soil and native vegetation from geothermal emissions, Journal of Environmental Quality, v. 15, no. 3, 1986, pp. 260-265.

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statement in the DEIR applies only to the first 2.3 years of operation of the Project and does not consider the accumulation of boron over time.

Boron accumulates in soils and vegetation over time.[149] According to DEIR estimates, 8.25 lbs of boron from the cooling towers would be added to downwind soils every year. At the end of the 45-year life of the Project, 371 lbs of boron would be present in downwind soils and local vegetation. Studies indicate that foliage boron generally increases linearly with the concentration of boron in the soil solution.[150] Therefore, boron concentrations in both soil and vegetation would roughly increase linearly over the lifetime of the Project.

The regression relationships and other information from the Lang Study can be used to estimate the impact of boron deposition on downwind vegetation. Using the results for Unit 13 (0.06 - 3.75 lbs/ac-yr), whose measured deposition rate is similar to the Project, the estimated DEIR boron deposition rate of 1.43 pounds per acre per year ("lbs/ac-yr") corresponds to a boron soil saturation extract concentration of about 0.27 mg/L after 2 years of deposition.[151] (Lang Study, Fig. 1.) At the end of the 45 year operating life of the Project, the boron soil saturation extract concentration would be about 5.3 mg/L.[152]

The PG&E study reviewed the boron plant toxicity data and concluded that boron soil saturation extract concentrations of less than 1 mg/L were generally safe for all plants, that concentrations of 1.0 to 5.0 mg/L were slightly toxic to some plants, that concentrations of 5.0 to 10 mg/L were moderately toxic to many plant species, and that concentrations over 10 mg/L were severely toxic to all tested plants. (Lang Study, p. 262.) Therefore, at the end of the lifetime of the Project, 5.3 mg/L of boron would be high enough to be moderately toxic to many plant species.

According to the DEIR, the predominant vegetation adjacent to and downwind of the Project is lodgepole pine forest (DEIR, Fig. 3.7-5), although other vegetation including mixed

[149] A. Kabata-Pendias and H. Pendias, Trace Elements in Soils and Plants, 2nd Ed., CRC Press, Boca Raton, FL,1992, pp. 153-161.

[150] A.M. El-Sheikh, A. Ulrich, S.K. Awad, and A.E. Mawardy, Boron Tolerance of Squash, Melon, Cucumber, and Corn, J. Am. Soc. Hort. Sci., v. 96, 1971, pp. 536-537.

[151] Using the regression equation for Unit 13, $\ln Y = -1.70 + 0.85 \ln X$ where Y is soil boron saturation extract concentration in mg/L and X is the boron deposition rate in kg/ha-yr. For a boron deposition rate of 1.43 lbs/ac-yr (1.60 kg/ha-yr), the soil boron concentration $Y = \exp[-1.70 + 0.85\ln(1.60)] = 0.27$ mg/L.

[152] Assuming uptake is linear over the 45 year operating life of the Project, at the end of 2.3 years, the boron soil saturation extraction concentration would be 0.27 mg/L. (PG&E Study, Fig. 1.) By proportions, the concentration at the end of 45 years would be (0.27 mg/L)(45 yrs)/2.3 yr = 5.28 mg/L.

conifer forest is present. (DEIR, Table 3.7-1.) Boron toxicity data are not available for lodgepole pine. However, the PG&E work investigated a digger pine, a related species, and other mixed conifer forest species. These studies found substantial visible foliage injury around Unit 5-6, including tip burn and marginal chlorosis and necrosis, with visible injury ranging from 0 to 94 percent of the foliage area on some species. (Lang Study, p. 263.)

Based on the PG&E work, a boron soil saturation extract concentration of 5.3 mg/L corresponds to a foliage boron concentration of 170 in digger pine, the only pine that was investigated. (Lang Study, Fig. 2.) This boron level was associated with about 3 percent visible foliage injury. For other species, this level of soil boron corresponded to 1,090 mg/kg of boron in foliage and 75 percent visible foliage injury. (Lang Study, Fig. 3.)

Other Emissions. In addition to failing to note that the comparison unit had operated only 2.3 years, the DEIR also fails to note that the cooling towers are not the only source of boron emissions. The PG&E study also pointed out that another reason that no vegetation damage was found at Unit 13 was because in addition to the cooling tower, there were "fewer nearby B(oron) emission sources (e.g., steam wells, natural fumaroles, other cooling towers)." (Lang Study, p. 262.)

The DEIR boron deposition rate for the Project is calculated using only the boron emissions of 8.25 lbs/yr from the cooling tower. (DEIR, p. 4-91.) However, other sections of the DEIR indicate that boron is routinely emitted from other sources, principally the vent silencers, which are also located at the power plant. (DEIR, pp. F-6, F-14.) Additional amounts of boron are also emitted during upsets and well venting. (DEIR, pp. F-13, F-17.) The total routine operational boron emissions from the Project are reported to be 17.4 lbs/yr. (DEIR, p. 2-45.) Therefore, the actual boron deposition rate would be about twice as high as the value used in the DEIR to estimate the boron deposition rate. The actual boron deposition rate would be about 3 lbs/ac-yr.[153]

Repeating the calculations presented above using 3 lbs/ac-yr yields a boron soil saturation extract concentration of 0.51 mg/L at the end of 2.3 years and of 10.1 mg/L at the end of 45 years. According to the Lang Study, 10 mg/L is the threshold for severe plant toxicity. (Lang Study, p. 262.) A boron soil saturation extract concentration of 10.1 mg/L corresponds to a foliage boron concentration of 232 mg/kg in digger pine and about 7 percent visible foliage injury. In other tree species, it corresponds to 1,660 mg/kg in foliage and injury of essentially all foliage. (Lang Study, Figs. 2, 3.)

Finally, as discussed in Comment 1.d, the applicant apparently underestimates toxic emissions. Actual boron emissions would probably be about 612 lbs/yr, consistent with measurements made at The Geysers in the Lang Study, not 17.4 lbs/yr. The corresponding deposition rate would be 106 lbs/ac-yr, which is 74 times higher than the value used in the DEIR. Impacts would be proportionately more severe and would be significant as discussed above.

[153] Actual boron deposition rate = (1.43 lbs/ac-yr)(17.4 lb/yr/8.25 lb/yr) = 3.02 lbs/ac-yr.

In sum, the emissions of boron from the Project are high enough to damage downwind vegetation. The impacts described here would be proportionately larger if boron emissions were larger than those used in the DEIR. This could occur, for example, if emissions are underestimated (Comment 1.d), or additional units were constructed in this general area. This is a significant impact that was not revealed in the DEIR and which must be mitigated. The impact of boron emissions on vegetation should be re-analyzed using the results of the Lang Study and the revised EIR recirculated for public review.

b. Other Elements May Adversely Impact Local Vegetation

In addition to boron, the Project would emit comparable or larger quantities of fluorine, bromine, strontium, and barium (Comment 1.g). All of these substances are toxic to plants at the concentrations that would likely result from Project emissions.[154] The DEIR does not evaluate the impact of any of these other elements on local vegetation. Fluorine, in particular, is far more toxic than boron. AG.250

Fluorine. About 0.4 lbs/MWh of fluorine are emitted by geothermal power plants. (Ellis 1978.) Therefore, about 175,000 lbs/yr would be emitted by the Project. Fluorine is considered to be the most hazardous and phytotoxic trace pollutant among the common air pollutants such as ozone, SO_2, and NOx. The amount of fluorine normally accumulated from the soil is small, and there is little relationship between the concentration of fluorine in the soil and that in the plant. Therefore, most fluorine is accumulated directly from the atmosphere, where it is usually present as hydrofluoric acid, into the leaf through stomata and the cuticle. Fumigation experiments indicate that plants accumulate from 1 to 4 ppm F per $\mu g/m^3$ per day ("ppmF/$\mu g/m^3$-day").

Fluorine adversely affects plant metabolism, retards growth, inhibits reproduction, causes foliar injury, and reduces yield. Many conifers, including lodgepole pine and ponderosa pine, which are common in the study area (DEIR, Table 3.7-1), are highly susceptible to needle injury during the period of needle elongation. Thereafter, they are classified as tolerant. The presence of sulfur dioxide apparently aggravates these conditions.[155] Wide spread forest damage from fluorine has been documented around fluorine sources in a number of locations. For example, severe morbidity and mortality in ponderosa pine and lodgepole pine forest was documented on 2000 acres surrounding an aluminum reduction plant in Montana.[156] Susceptible plants are injured by foliar concentrations between 20 and 150 ppm (dry weight). Finally, fluorine in AG.251

[154] A. Kabata-Pendias and H. Pendias, 1992; M. Ya. Shkolnik, Trace Elements in Plants, Elsevier, Amsterdam, 1984.

[155] D.F. Adams and others, Atmospheric Pollution in the Ponderosa Pine Blight Area, Industrial and Engineering Chemistry, v. 44, no. 6, 1952, pp. 1356-1365.

[156] W.H. Smith, Air Pollution and Forests, Springer-Verlag, New York, 1990, pp. 493-494.

forage is toxic to animals at low concentrations.[157] Concentrations greater than 30 to 40 ppm dry weight in forage are toxic to animals.[158] (Kabata-Pendias and Pendias 1992, p. 249.)

These thresholds would be readily exceeded by Project emissions and would probably result in significant damage to local vegetation and wildlife. Using the DEIR's analysis, if the emission of 14,400 lbs/yr of hydrogen sulfide results in an annual average concentration of 0.092 $\mu g/m^3$ at Grouse Hill, the peak concentration (DEIR, p. F-47), then the emission of 175,000 lbs/yr of fluorine would result in an ambient concentration of 1.1 $\mu g/m^3$ at Grouse Hill.[159] Fumigation experiments demonstrate that 1 to 4 ppmF/$\mu g/m^3$-day of fluorine are accumulated by leaves. Using the lowest reported accumulation rate, at the end of the 45 year plant life, theoretically, the foliage of vegetation between the plant and Grouse Hill would have fluorine concentrations of up to 18,100 ppm F.[160] The upper end of the injury range for sensitive plants, 150 ppm, would be exceeded after only 136 days of operation of the Project. Finally, at Lava Beds National Monument, foliar fluorine concentrations would reach 199 ppm[161] at the Visitor Center and 721 ppm[162] at the southwest corner after 45 years of operation. Therefore, conifers and other vegetation throughout a wide geographic area and wildlife dependent upon it, could potentially be damaged by fluorine emissions from the Project. This is a significant impact that should be mitigated.

Lithium. Lithium is present in high concentrations in geothermal fluids from the Medicine Lake area. (DEIR, Table 3.4-1.) About 0.8 lbs/MWh of lithium are emitted by geothermal power plants with comparable amounts of lithium. (Ellis 1978.) Therefore, about 350,000 lbs/yr would be emitted by the Project. Lithium is typically very soluble in soil pore water and readily absorbed by vegetation. It is toxic to some plant species at foliar concentrations of 4 to 40 ppm and damages root tips and foliage. (Kabata-Pendias and Pendias AG.252

[157] L.P. Gough, H.T. Shacklette, and A.A. Case, Element Concentrations Toxic to Plants, Animals, and Man, U.S. Geological Survey Bulletin 1466, 1977, pp. 25-26.

[158] L.H. Weinstein, Fluoride and Plant Life, J. Occup. Med., v. 19, 1977, pp. 49-78; E. Groth, Fluoride Pollution, Environment, v. 17, 1975, p. 29.

[159] Fluorine concentration = (0.093 $\mu g/m^3$ H_2S)(175,000 lbs F/14,400 lbs H_2S) = 1.1 $\mu g/m^3$.

[160] Fluorine concentration in foliage of vegetation between the plant and Grouse Hill = (1.1 $\mu g/m^3$)(1 ppmF/$\mu g/m^3$-day)(365 days/yr)(45 yrs) = 18,068 ppm.

[161] Foliar fluorine concentration at Lava Beds National Monument Visitor Center = (0.000997 $\mu g/m^3$ H_2S)(175,000 lbs F/14,400 lbs H2S)(1 ppmF/$\mu g/m^3$-day)(365 days/yr)(45 yrs) = 199 ppm. The annual average hydrogen sulfide concentration is from the DEIR, p. F-47.

[162] Foliar fluorine concentration at southwest corner of Lava Beds National Monument = (0.00361 $\mu g/m^3$ H_2S)(175,000 lbs F/14,400 lbs H2S)(1 ppmF/$\mu g/m^3$-day)(365 days/yr)(45 yrs) = 721 ppm. The annual average hydrogen sulfide concentration is from the DEIR, p. F-47.

1992, p. 92.) These thresholds would be readily exceeded by Project emissions and may result in significant damage to local vegetation.

Bromine. About 0.7 lbs/MWh of bromine are emitted by geothermal power plants. (Ellis 1978.) Therefore, about 300,000 lbs/yr would be emitted by the Project. Plants readily take up bromine from soils. Bromine is typically elevated in vegetation grown in volcanic soils. Bromine is toxic to vegetation and its effects are similar to salts and boron, including chlorosis and tip necrosis. (Kabata-Pendias and Pendias 1992, p. 253.) The impact of bromine emissions may be significant and should be evaluated. AG.253

Other Elements. Barium and strontium occur at concentrations that are similar to bromine. Both are readily taken up by plants and toxic to plants at low concentrations. Strontium in vegetation is toxic to plants at 30 ppm actual weight, while barium is toxic at 220 ppm. Antagonistic interactions occur when the two co-occur. (Kabata-Pendias and Pendias 1992, pp. 115-120.) These thresholds would be readily exceeded by Project emissions.

In sum, the emissions of phytotoxic elements may be present in sufficient concentrations in power plant emissions to adversely affect local vegetation and wildlife that is dependent on it. The DEIR failed to evaluate the impact of any substance except boron. The impact of deposition of all phytotoxic elements should be determined by estimating ambient concentrations, deposition rates and soil concentrations and using standard bioconcentration factors to extrapolate soil concentrations to vegetation concentrations. An ecological risk assessment should be completed to determine the effect of toxic pollutant emissions on local vegetation and wildlife using standard U.S. EPA procedures. (U.S. EPA 1992.) The DEIR should be revised accordingly and recirculated for review. AG.254

HUMAN HEALTH AND SAFETY

14. Health Impacts From Chlorine Releases Would Be Significant

The DEIR indicates that chlorine gas would be used as a biocide and stored in a 1-ton metal cylinder near the cooling tower. (DEIR, pp. 2-29, 4-279; Table 4.15-3). Chlorine is a powerful oxidant and severe irritant of the eyes, nose, throat, and lining of the respiratory tract. Liquid chlorine will cause skin and eye burns on contact.[163] AG.255

Accidents involving chlorine cylinders are legendary. Piping, valves, and the cylinders themselves can leak or rupture,[164] releasing large amounts of this corrosive gas into the atmosphere. Chlorine was the biocide of choice historically. However, as the dangers associated

[163] G.D. Clayton and F.E. Clayton, Patty's Industrial Hygiene and Toxicology, 4th Ed., John Wiley & Sons, Inc., New York, Vol. II, Part F, 1994, pp. 4484-4487.

[164] Compressed Gas Association, Inc., Handbook of Compressed Gases, 3rd Ed., 1990, pp. 317-318.

with storage and handling of chlorine became known, on-site storage of chlorine has been gradually replaced by other alternatives, such as on-site chlorine generation and use of alternate chemicals. Today, chlorine cylinders are rarely proposed for new facilities subject to CEQA review because of the substantial hazards associated with their storage and use. Further, cheap and effective alternatives, such sodium hypochlorite, are readily available and eliminate these risks.[165]

Although the DEIR concedes that chlorine is an acute health hazard and highly toxic (DEIR, Table 4.15-3), the DEIR fails to perform any analyses of its potential impact during an accidental release. These analyses are critically important because up to 19 workers would live on-site in a service and dormitory building (DEIR, p. 2-33) and could potentially be exposed to released chlorine. Further, recreators and wildlife would potentially be present in the vicinity of the Project.

Releases from chlorine cylinders are widely recognized as being both probable and significant and are always included in EIRs and Risk Management and Prevention Plans ("RMPPs"). Therefore, the accidental release from the proposed 1-ton chlorine cylinder was analyzed. Rob Sears used ALOHA Version 5.2 for Windows to model a chlorine release from a 1/2 inch valve at the top, middle, and bottom of a horizontal cylinder that is two-thirds full of chlorine. The length of the plume (i.e., the distance that gas of a given concentration would travel from the release point) was estimated for three exposure concentrations.

Emergency exposure limits have been established by a number of agencies and are routinely used as significance thresholds in accidental release modeling. The National Academy of Sciences has established a 60-minute emergency exposure limit of 3 ppm based on the concentration that produces nasal and eye irritation.[166] The National Institute for Occupational Safety ("NIOSH") and the Occupational Safety and Health Administration ("OSHA") has established an immediately dangerous to life or health ("IDLH") value for chlorine of 10 ppm. This is the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects.[167] Finally, the AIHA has established emergency response planning guidelines for

[165] G.C. White, Handbook of Chlorination and Alternative Disinfectants, 3rd Ed., 1992.

[166] National Research Council, Board on Toxicology and Environmental Health Hazards, Emergency and Continuous Exposure Limits for Selected Airborne Contaminants, Volume 2, October 1984, p. 7.

[167] G.V. Alexeeff, M.J. Lipsett, and K.W. Kizer, Problems Associated with the Use of Immediately Dangerous to Life and Health (IDLH) Values for Estimating the Hazard of Accidental Chemical Releases, American Industrial Hygiene Association Journal, v. 50, 1989, pp. 598-605.

chlorine. The ERPG-3 for chlorine is 20 ppm and is the concentration above which life-threatening health effects can result.[168]

The modeling for all three scenarios is included in Attachment D. The least severe impacts (smallest impact zone) occur for the hole at the top of the cylinder. For this scenario, a concentration of 3 ppm would be experienced by sensitive receptors up to 5,600 feet (1.7 km) from the release point. A concentration of 10 ppm would be experienced by sensitive receptors up to 2,700 feet (0.82 km) from the release point. A concentration of 20 ppm would be experienced up to 1,800 feet (0.54 km) from the release point. These concentrations could result in severe nasal and eye irritation, irreversible health impacts, and death in both on-site workers and nearby recreators and wildlife. This is a significant impact that was not discussed in the DEIR.

The DEIR should be revised to analyze the impact of releases from the chlorine cylinder on on-site workers/resident, recreators, and wildlife using a standard heavy gas dispersion model such as DEGADIS or ALOHA. The resulting significant impact should be mitigated by requiring the use of an alternate biocide.

15. Hazardous Wastes Are Not Discussed

The DEIR fails to identify, characterize, quantify, and generally discuss the hazardous wastes that would be generated by the Project and the methods that would be used to contain, transport, dispose, and minimize their production. The DEIR also fails to acknowledge that there are regulations that require waste minimization and recycling, where feasible. Both RCRA and the California Hazardous Waste Management Act encourage waste minimization and recycling (42 U.S.C. Sec. 6902(8), Health and Safety Code Sec. 25179.4(a) and (b).) This information must be included in an EIR so potential impacts can be identified and mitigation incorporated into the project. AG.256 AG.257

Section 4.15.1, "Storage, Use, Transport, and Disposal of Hazardous Materials," suggests that this material is present, but it is not. This section identifies, characterizes, and quantifies hazardous chemicals that would be used at the site, but not the hazardous wastes that would be produced. Instead, it dismisses hazardous wastes by stating that wastes would be characterized and disposed in accordance with local regulations. (DEIR, pp. 4-278, 4-279.) Elsewhere, the DEIR lists and discusses several "solid wastes" without telling the reader that some of these are normally hazardous. (DEIR, pp. 2-32, 2-33.) This is misleading. AG.258

The Project would produce several wastes that are normally classified as hazardous under California regulations and sent to Class I landfills. These include cooling tower sludge,

[168] American Industrial Hygiene Association, Emergency Response Planning Guidelines ("ERPGs"), Chlorine, April 20, 1988.

production system scales, and sulfur.[169] Sludges deposit in the bottom of cooling towers and must be periodically disposed. The DEIR indicates that 4 to 12 dry tons per year would accumulate, but suggests that it would consist of "dirt and particulates removed from the ambient air and also elemental sulfur and chelated iron compounds." (DEIR, p. 2-33.) The DEIR fails to mention that it is usually hazardous because it contains high concentrations of toxic metals such as mercury and arsenic. Mercury concentrations, for example, range from 0.02 to 0.2 percent. (Robertson et al. 1977, p. 1097 and 1978, p. 581.) Cooling tower sludges can be eliminated by using air cooling, as discussed in Comment 7.b.

Scales commonly form in production systems, particularly water dominated systems such as the Glass Mountain KGRA. In geothermal systems that have elevated arsenic levels, which this one apparently does (Comment 1.f), the arsenic accumulates in these scales and results in their classification as hazardous waste. (Suess and Wardlow 1993, p. 76.) Scale formation can be controlled to reduce this hazardous waste.

Finally, about 240 wet tons per year of sulfur cake would be produced by the Stretford hydrogen sulfide abatement process. (DEIR, p. 2-33.) The DEIR failed to disclose that this sulfur typically contains elevated concentrations of metals, including mercury and vanadium and that it is frequently classified as a hazardous waste. (Suess and Wardlow 1993, p. 76.) This hazardous waste can be eliminated by selecting a sulfur removal technology that does not produce a solid byproduct, such as the burner-scrubber unit being considered by the Project, or by purifying the sulfur and selling it as a byproduct.[170]

In sum, this DEIR fails to disclose the hazardous nature of wastes that would be produced and fails to evaluate and require methods to minimize and recycle them. The DEIR should be revised to identify, characterize, quantify, and describe each hazardous waste that would potentially be produced. An engineering analysis should be performed for each to determine whether they can be reduced or recycled, considering, among others, the methods discussed here. The DEIR must be revised to include a mitigation measure that requires waste minimization and recycling on an on-going basis. AG.259

16. Health Risks From Presence Of Project Facilities Are Significant

Although the DEIR concedes that the general wellfield area would not be fenced, it incomprehensibly concludes that this would not present a significant threat to human health and safety. (DEIR, p. 4-292.) The Project includes four production well pads and three injection well pads of 2.5 acres each, 1.5 miles of production and injection pipeline, and 1.85 miles of AG.260

[169] R.E. Suess and C.L. Wardlow, Geothermal Waste Issues in RCRA Reauthorization, Geothermal Resources Council Transactions, v. 17, 1993, pp. 75-79.

[170] P.S. Thind, Environmental Characteristics and Occupational Hazards Associated with Abatement of Non-condensable Gases at the Geysers, Geothermal Resources Council Transactions, v. 13, 1989, pp. 101-104.

injection pipeline. (DEIR, p. 2-12.) According to the DEIR, none of these facilities except two small sumps on each of the well pads comprising 0.4 acres would be fenced. (DEIR, pp. 4-291, 4-292.) Therefore, the wells, other facilities on the well pad (pumps, diesel tank, generators, air compressor, pipe rack), and the insulated pipes would be accessible to the general public.

This not only places the facility at risk from either sabotage or accidental damage, but also endangers public health and safety. The pipelines would be placed on above-ground supports and elevated to an average of 4 feet above ground so that they are above expected snow levels. (DEIR, p. 2-19.) These pipelines sprawl across a large geographic area which is easily accessible by Forest Service roads 49 FS, 44N54, and 44N64, which criss-cross the site and are currently maintained by the Forest Service or will be maintained by Calpine in the winter. (DEIR, p. 2-21, Fig. 3.7-1.) In fact, 1.5 miles of pipeline parallel these access roads. (DEIR, p. 2-12.) There are two snowmobile parks within 5 miles of the site.[171] Snowmobiles and cross country skiers would have ready access to the site and could collide with Project facilities if the facilities are buried in the snow or during inclement weather. Alternatively, facilities may simply be overlooked by snowmobilers, skiers, and horseback riders who could collide with these facilities under ideal conditions because one does not expect to encounter them in pristine recreational areas. Curiosity-seekers could tamper with Project facilities, including valves and the well itself, and cause dangerous releases of steam and toxic gases that would present a substantial health hazard. Pressure relief valves venting steam and toxic gases outside of the fenced area could adversely affect recreators. Finally, even the DEIR concedes that hunters firing weapons could accidentally strike facilities.

These are clearly significant impacts by any objective measure. The DEIR should be revised to find a significant public health and safety impact from the presence of Project facilities and to require mitigation. The entire facility, as defined in Figure 3.7-1, should be completely fenced to prevent unauthorized access to mitigate this impact.

17. Inadequate Winter Maintenance Procedures May Result In A Significant Worker And Public Health Hazard

The wellfield will require periodic access during winters for maintenance and for responding to emergencies. Winters are severe in the area and the snowpack is up to 4 feet thick. The DEIR indicates that in the wellfield, snow would be allowed to accumulate over all wellfield equipment, which would be marked with stanchions to serve as navigational aids in snowdrifts. Personnel would access the site with sno-cats and snowmobiles, excavate the area, and fix the facilities. (DEIR, pp. 2-35, 2-36.) AG.261

This is not adequate to assure ready access and is not consistent with practices normally used in areas with severe winter weather. Maintenance and emergency response will require that boom cranes and other heavy equipment be brought into the wellfield. These cannot be transported on sno-cats and snowmobiles. Further, in an emergency, rapid access to the wellhead

[171] U.S. Forest Service, Modoc National Forest, Map (1/5" = 1 mi), 1993.

and supporting facilities would be required. Excavation of the wellhead would unnecessarily delay response and could result in significant environmental and safety impacts.

The DEIR should be modified to find a significant worker and public safety impact from the failure to have adequate procedures to respond to emergencies and require mitigation to reduce this impact. Service roads into the wellfields should be maintained throughout the winter. The wellhead should be covered with a moveable enclosure to allow rapid access to facilities.

NOISE

18. The Impact Of Noise From The Transmission Line Was Not Evaluated

The DEIR does not evaluate the impact of noise from the proposed transmission line on humans (Sec. 4.14) or wildlife (Sec. 4.8) because it claims that operation of the line would not generate any noise. (DEIR, p. 4-266.) This is not correct. It is well known that power transmission lines produce audible noise, which has been characterized as a "constant hum" and measured at 63 dBA sound pressure level (Lp) below the lines.[172] This noise is known to annoy humans and adversely affect the behavior of reindeer.[173] The transmission line passes within 260 feet of the Medicine Lake Lava Flow and within 1200 feet of the North Campground at Medicine Lake, where sensitive receptors are located. (DEIR, p. 4-259, Fig. 3.7-2.) The DEIR should be revised to discuss and quantify transmission line noise and to propose mitigation measures, as appropriate. AG.262

19. The Impact Of Vibration From The Project Was Not Evaluated

The DEIR does not discuss or evaluate the impact of vibration from Project construction and operation on humans and wildlife. It is well known that construction and operation of geothermal power plants creates vibration. In humans, vibration is known to cause back pain, kidney trouble, sacroiliac strain, injuries to cell and tissues, changes in blood pressure, and discomfort, including nausea and vertigo.[174] Some wildlife, including snakes, salamanders, frogs, toads, and many insects are sensitive to vibration because they use it for communication to define territory, for mating calls, to detect predators, and for other purposes. (Bommer and Bruce AG.263 AG.264

[172] A.S. Bommer and R.D. Bruce, The Current Level of Understanding into the Impact of Energy Industry Noise on Wildlife and Domestic Animals, Proceedings of Spring Environmental Noise Conference, Alberta Energy and Utilities Board, 1996, p. 10.

[173] J.M. Lee, Jr. and D.B. Griffith, Transmission Line Audible Noise and Wildlife, In: J.L. Fletcher and R.G. Busnel (Eds.), Effects of Noise on Wildlife, Academic Press, New York, 1978, pp.105-167.

[174] A.G. Jhaveri, Environmental Noise and Vibration Control at Geothermal Sites, pp. 1375-1378.

1996, p. 16). The DEIR should be revised to discuss and quantify vibration impacts and to propose mitigation, as appropriate.

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ATTACHMENT A

SCAPCD PM10 Data

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JAMES R. MASSEY, JR.
AIR POLLUTION CONTROL OFFICER
PATRICK J. GRIFFIN
AIR POLLUTION SPECIALIST

PM10 DATA
MEDICINE LAKE/FOURMILE HILL

1995	Medicine Lake
08/31/95	10.00
09/06/95	35.32
09/12/95	22.22
09/18/95	35.45
09/24/95	17.73
09/31/95	—
10/06/95	20.45
10/12/95	23.30

1996	Head-Quarters	Power Plant
07/02/96	26.2	17.6
07/04/96	25.5	—
07/08/96	18.1	18.6
07/14/96	5.3	5.4
07/20/96	20.2	14.7
07/26/96	14.0	7.9
08/01/96	9.4	5.2
08/07/96	26.9	9.8
08/13/96	25.4	4.2
08/20/96	34.8	34.7
08/26/96	15.7	19.3
08/31/96	37.7	40.0
09/06/96	29.7	12.2
09/12/96	20.5	18.4
09/18/96	9.2	12.7
09/24/96	29.5	36.6
09/30/96	26.3	11.5

Headquarters is the U.S. Forest Service Headquarters at Medicine Lake.

Power Plant is the proposed power plant site at Fourmile Hill.

LAVA BEDS

PM10 LEVELS - JUNE 1994 THROUGH DECEMBER 1996

1994

DATE	µG/m³
06/19	7.900
06/25	10.700
07/01	14.570
07/07	15.770
07/25	12.520
07/31	29.340
08/06	14.900
08/12	14.900
08/18	17.650
08/23	11.360
08/29	13.280
08/30	34.400
09/05	10.000
09/17	12.900
09/23	17.930
09/29	8.750
10/05	9.890
10/11	13.350
10/17	7.990
10/23	8.020
11/05	5.875
11/11	7.390
11/17	7.600
11/23	5.080
11/29	2.679
12/04	2.896
12/10	3.453
12/16	3.139
12/22	7.689
12/28	3.321

1995

DATE	µG/m³
01/03	5.973
01/09	invalid
01/15	2.542
01/21	2.863
01/27	5.502
02/02	7.924
02/08	4.910
02/14	7.368
02/20	5.425
02/26	7.163
03/04	3.506
03/10	2.947
03/16	4.163
03/22	5.361
03/28	9.469
04/03	6.405
04/09	3.158
04/15	3.981
04/21	6.070
04/27	7.395
05/03	5.878
05/09	6.561
05/15	8.360
05/21	18.650
05/27	15.585
06/02	18.517
06/08	6.534
06/14	4.127
06/20	3.801
06/26	13.609

DATE	µG/m³
07/02	9.734
07/07	9.764
07/14	8.765
07/20	17.739
07/26	12.120
08/01	13.181
08/07	9.364
08/13	9.415
08/19	11.880
08/25	8.060
08/31	7.594
09/06	13.498
09/12	13.251
09/18	9.774
09/24	12.324
09/30	3.391
10/06	25.771
10/12	3.125
10/18	invalid
10/24	11.848
10/30	10.937
11/05	8.869
11/11	3.158
11/17	7.015
11/23	3.003
11/29	3.964
12/05	1.988
12/09	4.387
12/10 thru 1/15	machine inoperable

1996

DATE	µG/m³
01/17	1.686
01/23	6.965
01/26	2.016
02/03	4.319
02/09	3.635
02/15	7.130
02/21	3.275
03/04	1.037
03/10	2.410
03/16	4.726
03/22	9.396
03/28	2.779
04/03	5.420
04/09	8.421
04/15	6.669
04/21	invalid
04/27	8.557
05/03	14.571
05/09	invalid
05/15	5.986
05/21	4.611
05/27	10.816
06/02	13.273
06/08	16.509
06/14	16.472
06/20	5.731
06/26	4.933

DATE	µG/m³
07/02	18.945
07/08	17.372
07/14	12.131
07/20	invalid
07/26	invalid
08/01	5.011
08/07	12.157
08/13	16.291
08/19	23.549
08/25	23.528
08/31	12.435
09/06	9.726
09/12	9.123
09/18	5.607
09/24	9.845
09/30	12.438
10/06	187.824
10/12	16.713
10/18	invalid
10/24	invalid
10/30	9.362
11/06	8.725
11/11	9.169
11/17	0.229
11/23	2.104
11/29	invalid
12/05	invalid
12/11	invalid
12/17	invalid
12/23	invalid
12/29	invalid

* prescribed fire @ Lava Beds

ATTACHMENT B

Hydrogen Sulfide Odor Threshold Articles

ENVIRONMENTAL RESEARCH 61, 78–83 (1993)

International Comparison of Odor Threshold Values of Several Odorants in Japan and in The Netherlands[1]

YASUYUKI HOSHIKA,* TAKASHI IMAMURA,† GIICHI MUTO,‡
L. J. VAN GEMERT,§ J. A. DON,[‖] AND J. I. WALPOT[‖]

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Received June 1, 1991

The purpose of this paper is to compare the published odor threshold values of six odorants. In Japan, all of the odor threshold values used in the Offensive Odor Control Law (enacted in 1972) were determined in an odor-free room (4 m³) by a trained panel (20 men, ages 30–45 years who were perfumers) who sniffed the odors directly and made absolute judgments of odor quality and intensity. In The Netherlands, sensorial odor concentration measurements were made with an olfactometer in a mobile sniffing car with eight panelists, four men and four women, ages 18–40 years. Such presentations are repeated with different dilution ratios. Comparison of the threshold data for the six different compounds given as the barely perceptible concentration level revealed striking similarities for hydrogen sulfide (in Japan 0.0005 ppm/in The Netherlands 0.0003 ppm), phenol (0.012/0.010), styrene (0.033/0.016), toluene (0.92/0.99), and tetrachloroethylene (1.8/1.2) but not for *m*-xylene (0.012/0.12). Such a similarity was not found with any other literature sources. © 1993 Academic Press, Inc.

INTRODUCTION

In Japan, the Offensive Odor Control Law was enacted in 1972 (Environment Agency, 1972). In 1991, there were 12 controlled odorants: ammonia, methyl mercaptan, hydrogen sulfide, dimethylsulfide, dimethyl disulfide, trimethylamine, acetaldehyde, styrene, propionic acid, *n*-butyric acid, *n*-valeric acid, and isovaleric acid. The ranges of ambient air-controlled concentrations from factories are 0.0009 ppm (*n*-valeric acid) to 5 ppm (ammonia). These concentrations correspond to 2.5 to 3.5 on a 6-point odor intensity scale: no odor, barely perceptible or detectable, faint or recognizable, easily noticed, strong, and very strong (Katz and Talbert 1930). The actual concentrations of odorants in the air were determined by gas chromatography with the cold-trapping (liquid oxygen) and the adsorption trapping methods with porous polymer beads, such as Tenax-GC (for styrene), and chemical reaction by strontium hydroxide on glass beads (for lower fatty

[1] Presented at the Fourth International Symposium on Neurobehavioral Methods and Effects in Occupational and Environmental Health, July 8–11, 1991, Tokyo, Japan.

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acids) followed acid–base chemical reaction for regeneration (Hoshika *et al.*, 1981a; Hoshika, 1982).

Odor threshold values of odorants in air in odor test systems vary widely, depending on such factors as the observer, the technique for low background level, and the purity of the odorants.

Of the experimental parameters used to measure odor threshold values, the determination of actual concentrations of odorants in the odor test systems is one of the more important.

Leonardos *et al.* (1969) used an odor test room which had a volume of 13.2 m³ to determine the odor threshold values of 53 odorants. Smith and Hochstettler (1969) reported the determination of odor threshold values in air using ^{14}C-labeled compounds and scintillation counting to monitor concentrations. Mills *et al.* (1963) also used an odor-free room for quantitative odor measurements. However, in their work, the actual concentrations of the odorants in the odor test room were not determined by reliable methods. Fluck (1976) used an odor test room that had a volume of approximately 28.2 m³ and a low odor background to determine the odor threshold of phosphine. Concentrations of the phosphine were determined by using detector tubes. Whisman *et al.* (1978) evaluated ethanethiol and tetrahydrothiophene as odorants in propane, measuring concentrations in air in four testing modes by gas chromatography. Buttery *et al.* (1981) reported the odor threshold of thiamine odor compounds using odor-free Teflon squeeze bottles equipped with Teflon tubes.

Hoshika and Muto (1982) reported the determination of the actual concentrations of 46 odorants prepared in air in a 10-m³ stainless-steel odor test room. The 46 odorants tested were 4 sulfur compounds, 10 lower aliphatic carbonyl compounds, an aromatic hydrocarbon, 7 lower aliphatic monoalcohols, 11 phenols, 6 lower fatty acids, and 7 indoles.

The recoveries of the odorants having boiling points lower than about 150°C were quantitative, but those having boiling points higher than 160°C gave recoveries of about 50%, except for the phenols, which had much lower recovery levels. Unfortunately, odor threshold measurements depend largely on the purity of the odorants; for example, the reported odor threshold concentrations of hydrogen sulfide vary from 0.65 to 1400 μg/m³ (Sullivan, 1969).

However, there are few reports on the determination of threshold values of a wide variety of odorants in an odor test system. This paper describes a comparison of published threshold data for six different compounds given as barely perceptible or detectable concentration level by subjects in two countries, Japan and The Netherlands.

MATERIALS AND METHODS

Reagents

Hydrogen sulfide (of 99.6% minimum purity) was obtained from Matheson Gas Products (East Rutherford, NJ). The standard solution of hydrogen sulfide was prepared by dissolving the pure gas (50 ml) in 50 ml of water. The hydrogen sulfide solution was standardized by iodometric titration. Phenol (of 98% minimum pu-

rity) was obtained from Wako Pure Chemical Industries Ltd., and a standard solution was prepared by dissolving 1 g of phenol in 100 ml of ethanol. Styrene, minimum assay 95% was stabilized with 0.003–0.004% of 4-*tert*-butylcatechol (chemical grade).

m-Xylene (of 98% minimum purity), toluene (of 98% minimum purity), and tetrachloroethylene (of 99% minimum purity) were obtained from Wako Pure Chemical Industries Ltd. All reagents were of guaranteed or reagent grade.

Odor Threshold Test System

In Japan, all of the odor threshold values used in the Offensive Odor Control Law (enacted in 1972) were determined in an odor-free room (4 or 10 m^3) by a trained panel (20 male perfumers, ages 30–45 years) who sniffed the odors directly and made absolute judgments of odor quality and intensity. The odor gases were prepared in the room on alternate days using directly static method (regress analysis). The odor test room, standard sample gas preparation in the odor-free test room, and gas chromatography for the determination of the actual concentrations of several odorants prepared in the odor-free room have been described previously (Environment Agency, 1980; Hoshika and Muto, 1982).

In The Netherlands, sensorial odor concentration measures are made with an olfactometer. The TNO sniffing car is mobile, with a cabin in which odorous air is mixed with clean odor-free room air and subsequently presented to panelists for assessments (Barker and Barker 1988; Don 1986; Miedema *et al.*, 1985; Roos *et al.*, 1984). Such presentations are repeated with different dilution ratios. The instrument was equipped with three sniffing cups (the so-called forced-choice triangle test method), with a minimal flow of 15 liters/min. There were eight panelists, four men and four women, ages 18–40 years.

From statistical analysis of a large number of scores with 50% correct response of the panel, odor concentrations are expressed in odor units/m^3.

In this paper, mg/m^3 is converted to parts per million (ppm) by using the equation

$$\text{ppm (vol/vol)} = \frac{22.4 \times A}{\text{MW} \times V \times \dfrac{273}{273 + t} \times \dfrac{P}{760}},$$

where A is the quantity of the odorant in milligrams, MW is the molecular weight of the odorant, V is the volume (in m^3) of the sample gas meter, t is 20°C of the gas meter in the sample gas, P is the barometric pressure (in mm Hg) of the sample gas, and 22.4 is constant.

RESULTS

The comparison of the published threshold data for the six different compounds is shown in Fig. 1. The odor threshold data used in this figure are given as barely perceptible or detectable concentrations in partial recognition threshold data. As shown in Fig. 1, the comparison of the published odor threshold data for the six different compounds given as barely perceptible or detectable concentration lev-

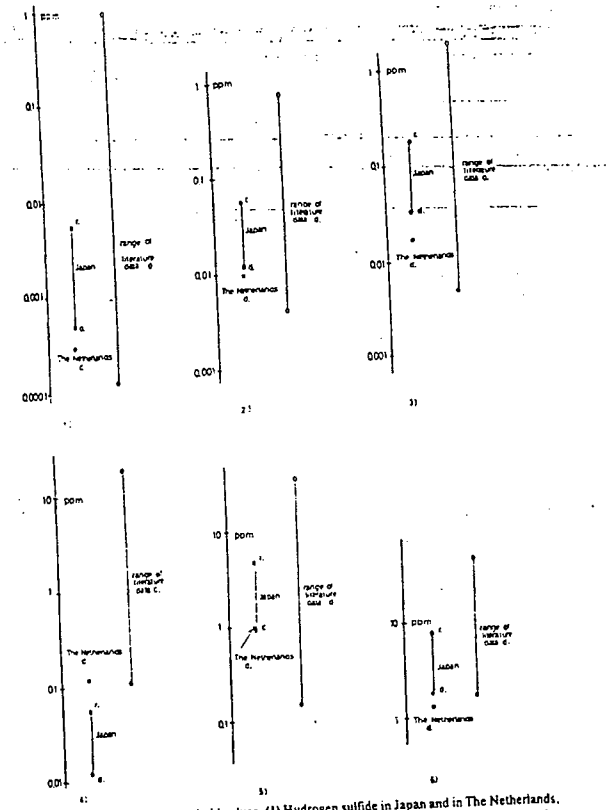

FIG. 1. Comparison of odor threshold values. (1) Hydrogen sulfide in Japan and in The Netherlands, and ranges of literature data: d, barely perceptible or detectable odor threshold; r, recognizable odor threshold. (2) Data on phenol: d and r are the same as in part 1. (3) Data on styrene: d and r are the same as in part 1. (4) Data on *m*-xylene: d and r are the same as in part 1. (5) Data on toluene d and r are the same as in part 1. (6) Data on tetrachloroethylene: d and r are the same as in part 1.

els revealed striking similarities for hydrogen sulfide (in the Japanese static method with odor-free test room the level is 0.0005 ppm and in The Netherlands dynamic flow method it is 0.0003 ppm), phenol (0.012 ppm/0.010 ppm), styrene (0.033 ppm/0.016 ppm), toluene (0.92 ppm/0.99 ppm), and tetrachloroethylene (1.3 ppm/1.2 ppm) and none for *m*-xylene (0.012 ppm/0.12 ppm). However, the origin of the remarkable difference in the *m*-xylene data between Japan and The Netherlands is unclear.

DISCUSSION

Such striking similarities were not found with any other literature sources (Van Gemert and Nettenbreijer, 1977). The data from literature before 1960 have been omitted. In Japan, the odor threshold values of odorants in air in odor test room vary widely, depending on such factors as the test procedure and technique, the observer, and the purity of the odorants.

The test odorants used must be of high purity, and a static air dilution system utilizing an air dilution medium that has a low background level of odors must be employed. The determination of the odor threshold values of the odorants onto the surface of the apparatus and from diffusion loss (Hoshika and Muto, 1982) must be made.

Of the experimental parameters used to measure odor threshold value, the determination of actual concentrations of odorants in odor test room air is one of the more important. The recoveries of hydrogen sulfide, phenol, and styrene were 95, 14, and 98%, respectively.

In The Netherlands, in each of the eight panelist's cabins in the sniffing car there are three sniffing cups where the air is presented for examination; diluted odorous air comes from one of the three cups, while odorless air comes from the other two. The panelists must determine which one of the three is different (the so-called forced-choice triangle test). From a statistical analysis of a large number of panel scores the odor concentrations are revealed by on-line data processing in a personal computer. The values of this parameter are by definition equal to the dilution ratio (Don, 1986), which correspond with 50% correct responses of the panel after correction for guessing. The mean value of at least five measurements was used.

CONCLUSION

It is suggested that at the barely perceptible concentration level, hydrogen sulfide, phenol, styrene, toluene, and tetrachloroethylene odors are perceived at the same levels Japan and in The Netherlands.

ACKNOWLEDGMENT

This work was supported by the National Institute for Genetics Japan NIG Cooperative Research Program Grants 33-1989, 39-1990, and 38-1991.

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Environmental Research

NON-CIRCULATING

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ISSN 0013-9351

Volume 61, Number 1, April 1993

NOTE-BOOK

The Odor Impact Model

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The Odor Impact (OI) Model concept[1] was developed to facilitate the analyses of odor problems in the community and industry. The model is a graphical representation of the response of a sample of the human population (odor panel) to the stimulus of a specific odor. The model, shown in Figure 1, is for the odor of hydrogen sulphide (H_2S).

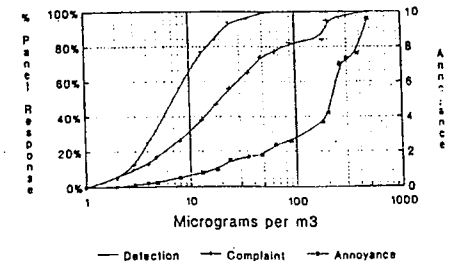
In developing the model, increasing concentrations of the odorant are administered to the panel members who record their reactions in terms of detection, complaint, and annoyance. These reactions are graphed as functions of concentration (it is also possible to express the curve mathematically as a hyperbolic tangent), and it is possible by looking at the graph to pick out a concentration acceptable for standard setting or other applications. For example, if we wanted to set a standard for hydrogen sulphide (H_2S), we could set it at 5.5 micrograms per cubic meter ($\mu g/m^3$) which is the 50 percent detection level. Health effects must first be checked and health experts must satisfy themselves that any such effects occur at higher concentrations. An interesting application of the model is its use in making a decision about the percentage of the population that will be allowed to detect the odor. This is a difficult decision, because in making it the decision makers must determine in effect how many people in the community they will allow to suffer the odor insults. This argument assumes that the panel is a true sample of the community. A possible approach for selecting the percent response is to use 16 percent, because the majority of the people will be between plus and minus one standard deviation (sigma), i.e., 68 percent. If this middle group is protected, then the average person is protected, and only the 16 percent of people with above average smelling ability will be allowed to suffer the odor insult.[2]

To date, the Air Resources Branch (ARB) of the Ontario Ministry of the Environment (MOE) has sponsored the determination of 86 of the Odor Impact Models for the chemical compounds listed in Table I. The 50 percent detection level concentration in $\mu g/m^3$ is also shown. The ARB also found it necessary to develop a procedure for the determination of Odor Impact Models so that industry or other interested parties could replicate the models and if necessary check their veracity. The procedure stipulates that panel members will not be subjected to odorant concentrations exceeding the threshold limit value (TLV).[3]

Following is a summary of the procedure for determination of odor impact models by the Binary Port Odor Panel Method:[4]

1. Nine member panel, members select one of two ports or neither. Odorant administered in concentration intervals differing by a factor of 1.4.

2. Maximum concentration of odorants administered to panelists limited to the TLV of the ACGIH, if there is no TLV, levels must be checked by medical experts. Panelists must sign a waiver releasing the laboratory and sponsor from liability.



Compound: Hydrogen Sulphide
Alternate Names:
CAS No.: [7783-06-4]
Molecular Weight: 34
Supplier: Matheson
Grade: certified standard mixture
Stated Purity: 8.3 ppm in nitrogen

Odour Impact Model

	Detection 1	Detection 2	Complaint 1	Complaint 2	
panel	4.5	7.6	21.0	13.0	ug/m3
	6.2	6.2	37.0	29.0	ug/m3
	6.0	8.7	19.0	18.0	ug/m3
	5.5	8.9	28.0	23.0	ug/m3
Geometric Mean	5.5	7.8	25.0	20.0	ug/m3
Pooled Value:	5.8	8.3	20.0	19.0	ug/m3

Hedonic Tone: unpleasant

Figure 1. Odor Impact Model for hydrogen sulphide.

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Table I. 50 percent detection levels ug/m³.

1. Acetaldehyde	90	44. Isopropyl Acetate	9,400
2. Acetic Acid	370	45. Isopropyl Alcohol	180,000
3. Acetone	40,000	46. Isopropyl Benzene	600
4. Acetylene	510,000	47. Isopar E	> 400,000
5. Ammonia	3,700	48. Kerosene	4,700
6. Biphenyl	3.3	49. Methyl Mercaptan	2.4
7. n-Butanol	3,100	50. Methyl Acrylate	61
8. Isobutanol	2,640	51. 5-Methyl-2-Hexanone	630
9. Tert-Butanol	42,000	52. Methyl Amyl Ketone	1,200
10. n-Butyl Acetate	1,000	53. Methyl Ethyl Ketone	4,500
11. Butyl Cellosolve	1,900	54. Methacrylic Acid	1,900
12. Butyl Cellosolve Acetate	6,500	55. Methoxy Butyl Acetate	650
13. Carbon Disulphide	3,900	56. Methyl Isobutyl Ketone	6,300
14. Chlorobenzene	4,500	57. Methyl Methacrylate	2,700
15. Cellosolve	11,600	58. Methyl Mercapto Aniline	1,700
16. Cellosolve Acetate	480	59. Methyl Nonyl Ketone	3,000
17. n-Decane	160,000	60. n-Methyl-2-Pyrrolidone	41,000
18. Diacetone Alcohol	60,000	61. Monomethylamine	230
19. Dimethyl Ether	430,000	62. Naptha	420,000
20. Dimethyl Disulphide	66	63. Naphthalene	450
21. Dimethyl Sulphide	51	64. Nitromethane	124,000
22. Diisobutyl Ketone	9,300	65. Octane	61,500
23. Dioxane	46,000	66. Oleic Acid	44,000
24. Diphenylamine	1,300	67. Oxohexylacetate	930
25. n,n-Dimethyl-Propanodiamine	> 200	68. Phenol	500
26. Diethyl ether	950	69. Propionaldehyde	210
27. Ethanol	36,000	70. Propylene Glycol	16,000
28. Ethyl acetate	28,000	71. Propyleneglycol monomethylether	121,000
29. Ethyl Acrylate	13	72. Propionic Acid	1,200
30. Ethylbenzene	1,900	73. Propionic Anhydride	3,400
31. 2-Ethyl-1-Hexanol	800	74. Propylene Dichloride	40,000
32. Ethylene Glycol	13,000	75. Propyleneglycol methyletheracetate	700
33. Ethylene Glycol Monohexyl Ether	2,500	76. Pyridine	1,500
34. Ethyl-3-Ethoxy-propionate	110	77. Solvesso 100	1,700
35. Ethyl Chloride	> 1 g/m3	78. Solvesso 150	2,400
36. Formaldehyde	2,200	79. Styrene	1,300
37. Furfural	2,800	80. Alpha Methyl Styrene	2,200
38. Gasoline (Fall-87)	3,800	81. Tetrahydrofuran	18,000
39. Heptane	110,000	82. Toluene	12,000
40. Heptanol	1,600	83. Trimethylamine	5.9
41. Hexylene Glycol	19,000	84. Trimethylolpropane	1,900
42. Hydrogen Sulphide	5.5	85. Trichlorophenol	1,000
43. Isobutyl Isobutyrate	2,900	86. Triethanolamine	> 61,000
		87. Xylene	3,600

3. Evaluation room must contain no fabric covered or other adsorbing or desorbing surfaces.

4. Evaluation room is ventilated at the rate of 15 air changes per hour. Ventilation air is filtered through a 4" × 24" × 2" activated charcoal filter.

5. Panel members must be able to detect odor in the vapor space of a solution of eight microlitres of tetrahydrofuran in 50 ml of distilled water to prove adequate sense of smell.

6. Panel members must not eat, smoke or drink flavored beverages for 30 minutes or use scented cosmetics for one hour prior to activity.

7. Original laboratory results and records of sources, dates of manufacture, purities, and any other identifying data on odorants used, must be noted in final report.

8. Replications must be within a factor of two.

9. Dynamic Olfactometer is assembled from 1/4 inch "Teflon" tubing, rotameters and a 3-way valve, sized to permit dilution of odorous gas from 11 to 7000 times.

10. Sniffing port constructed from 50 ml "Nalgene" or "Teflon" beaker joined with a bulkhead union to a 0.25 inch stainless steel tube. Ports are mounted on evaluation table at nose level.

11. Odorous gas and clean air flow rate to sniffing ports—not less than five l/min.

12. Cleaning of lines—flush with clean air for one minute after each concentration setting.

13. Length of panel work session—2 hours.

14. Time allowed for sniffing—15 seconds at each concentration.

15. Bags containing odorant in desired concentrations are prepared by injecting appropriate microlitre quantities of gas or liquid odorant into 30 litre "Tedlar" bags containing prepurified grade nitrogen filtered through a 1.5" × 10" charcoal canister.

16. Odorant concentrations must be verified with appropriate instrumental measurements.

17. Odorous gas is propelled to olfactometer by admitting compressed air into a chamber containing the "Tedlar" bag.

18. Clean air to panel is prepared by filtering compressed air through an MSA airline filter containing two activated charcoal filters and one particulate filter.

19. Panelists record responses as: detection—yes/no, complaint—yes/no, and annoyance—on a scale from 0 to 10.

20. Results are plotted in μg/m³ on a logarithmic scale on the X axis versus percent panel response on a linear scale on the Y axis.

Table II. Statistical analysis of replication test results.

	Ortech 88 ug/m³	Ortech 90 ug/m³	Old-new/old %
1. diacetone alcohol	60,000	37,418	37.63
2. dimethyl ether	430,000	303,967	29.31
3. methyl amyl ketone	1,200	398	66.83
4. carbon disulphide	3,900	1,269	67.46
5. n-Methyl Pyrrolidon	41,000	17,113	58.26
Average			51.898
Standard deviation			17.460
Confidence intervals:			
Student t, average	95% 27.628–76.167		
	99% 11.739–92.056		
Normal, average	95% 36.593–67.202		
Chi Square, standard deviation	95% 11.724–56.175		

	Clayton 87 ug/m³	Ortech 90 ug/m³	old-new/old %
1. propylene glycol monomenthyl ether	121,000	30,908	74.45
2. n-octane	61,800	99,102	45.81
3. isobutanol	2,640	1,723	34.73
4. n-butanol	3,100	591	80.93
5. n-butyl acetate	1,000	521	47.90
Average			56.764
Standard deviation			19.879
Confidence intervals:			
Student t, average	95% 29.132–84.395		
	99% 11.043–102.489		
Normal, average	95% 39.215–74.189		
Chi Square, standard deviation	95% 13.348–63.957		

As the replicability of the models is a key consideration in their widespread use and hoped for general acceptance, the results of the replication tests are also discussed below.

Replication Testing

The Odor Impact Models for numbers 7, 8, 10, 51, 65 and 71 on Table I were determined by Clayton Environmental Consultants of Windsor Ontario Principal Investigator Dr. A. W. Gnyp. The rest of the models were determined by Ortech International of Mississauga Ontario Principal Investigator M. Rix. Clayton Environmental used its own procedure in the determination. The procedure[4] employed by Ortech was used in the replication work, which was again conducted by Ortech. The purpose of both procedures was to establish the "S" shaped response curve by administering increasing concentrations to a panel of sniffers, however, because Ortech was replicating its own work as well as that of another laboratory, more differences can be expected between the Clayton models and Ortech's than between Ortech and Ortech. See Table II.

Discussion

The analysis shows that the expectation noted above is realistic. The replication is better between Ortech and Ortech models than between the Clayton and Ortech. The mean percent difference of the Ortech/Ortech replications is 51.898 percent with a standard deviation of 17.460 percent, while that between Ortech and Clayton is 56.764 percent with a standard deviation of 19.879 percent. The mean and standard deviation of the combined replications falls in between; the mean is 54.331 percent, the standard deviation is 17.824 percent.

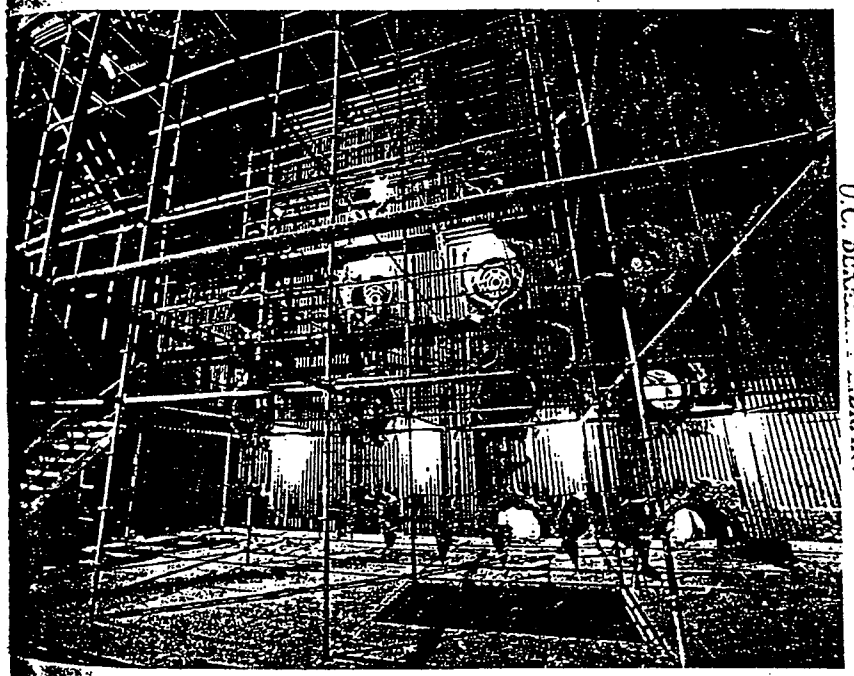
References

1. Gnyp, A. W.; St. Pierre, C. C.; Poostchi, E. M. "Development of Regulations for Odor Control," Department of Chemical Engineering, University of Windsor, Windsor, Ontario, 1986.
2. Olfactometry, *Odor Threshold Determination Fundamentals, VDI 3881*, Parts 1, 2 and 3, VDI Verlag Gmbh, D-4000 Dusseldorf.
3. "TLV's Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference for Governmental Industrial Hygieninsts (ACGIH), Cincinnati, OH.
4. "Procedure for Determination of Odor Impact Models by the Binary Port Odor Panel Method," Air Resources Branch, Ontario Ministry of the Environment, Report AMP #143, Toronto, Ontario 1988.

G. Z. Nagy, B.A.Sc., P.E., is with the Air Resources Branch, Ontario Ministry of the Environment, 880 Bay Street, Toronto, Ontario, M5S 1Z8. This note manuscript was peer reviewed.

SEPTEMBER 1991
VOLUME 41
NUMBER 9

Journal of the AIR & WASTE Management Association



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EXECUTIVE SUMMARY

ARB Contract A4-046-33

THE PERCEPTION OF HYDROGEN SULFIDE ODOR IN RELATION TO SETTING AN AMBIENT STANDARD

Prepared by: John E. Amoore, Ph.D.
Olfacto-Labs
7701 POTRERO AVENUE
EL CERRITO, CA 94530

Date submitted: April 10, 1985

Prepared for California Air Resources Board

in certain narrowly-defined situations, such as:

1. Where hydrogen sulfide is the sole, or at least the predominant and lowest-threshold, odorous species in the effluent.
2. Where the chemical mixture in the effluent is constant, and the hydrogen sulfide concentration has been previously demonstrated to be a consistent indicator of the overall odor threshold of the mixture.

For example, situation No. 1 might apply to geothermal steam, but the necessary conditions should be proved experimentally. Situation No. 2 could apply to certain refinery or pulp mill processes, but the correlation would have to be established initially, and then re-evaluated whenever there is a change of feedstock or processs conditions. An ambient air quality standard based on hydrogen sulfide concentration would have to be made applicable and equitable to all industries where fugitive emissions contain any hydrogen sulfide.

3. Detectability, intensity and annoyance of hydrogen sulfide levels. In deliberating the pros and cons of revising the ambient hydrogen sulfide standard, presently 30 ppb in California, it may be informative to consider a tabulation that sets out the predicted changes in detectability, intensity and annoyance of the odor, that would likely be associated with various hydrogen sulfide levels (Table VI). The calculations have been based on the currently most probable values of the mean detection threshold, the standard deviation of the threshold, the exponent of the odor intensity equation, and the ratio between annoyance and detection thresholds. (Revised calculations can be made if different values are later accepted for these properties.) The first two columns of Table VI provide data similar to the last two columns of Table II, but re-evaluated for round-number hydrogen sulfide levels and cumulative detection frequencies, which may be more convenient for purposes of standard-setting. At the current standard of 30 ppb, approximately 83% of people would be expected to be capable of detecting the odor. The perceived intensity at the threshold of 8.0 ppb is put arbitrarily at a value of 1.00. On this scale, the intensity at 30 ppb hydrogen sulfide would be only 1.41. The fourth column of Table VI expresses the hydrogen sulfide concentrations in odor units, or multiples of the odor threshold. The odor-unit scale tends to exagggerate the influence of odorant concentration.

The concepts developed in Section G-4 above, regarding the threshold of annoyance, permit the addition of a final column to Table VI for illustrative purposes. The percentages there entered are

Table VI. Predicted effects of ambient hydrogen sulfide level on frequency of odor detection, intensity of odor sensation, and incidence of annoyance by odor.

Hydrogen sulfide (ppb)	Persons able to detect odor[a] (%)	Perceived odor intensity[b] (ratio)	Odor units[c] (median)	Persons annoyed by odor[d] (%)
200	99[e]	2.31	25	88
100	96[e]	1.93	12	75
50	91	1.61	6.2	56
40	88	1.52	5.0	50
35	87	1.47	4.4	47
30	83	1.41	3.7	40
25	80	1.34	3.1	37
20	74	1.27	2.5	31
15	69	1.18	1.9	22
10	56	1.06	1.2	17
8	50	1.00	1.00	11
6	42	0.93	0.75	8
4	30	0.83	0.50	5
2	14	0.70	0.25	2
1	6	0.58	0.12	1
0.5	2	0.49	0.06	

a Based on adopted mean detection threshold of 8.0 ppb and S.D. ± 2.0 binary steps.
b For those who can detect the odor. Based on Lindvall's (1974) value for the intensity exponent, $n = 0.26$.
c Hydrogen sulfide level divided by mean detection threshold (8.0 ppb).
d Based on assumption that mean annoyance threshold is 5 x mean detection threshold, and S.D. ± 2.0 binary steps.
e Theoretical for a normal distribution. These percentages may be reduced by the occurrence of selective smell-blindness.

calculated on the assumptions that the median threshold for odor annoyance occurs at 5 times the median threshold concentration of odor detection, and that the standard deviation of individual thresholds for odor annoyance is the same (± 2 binary steps of concentration) as it is for the individual thresholds of odor detection. Accordingly, the expected point for 50% of the population to experience odor annoyance is at 40 ppb hydrogen sulfide. At the current California ambient air quality standard for hydrogen sulfide of 0.03 ppm (30 ppb), about 40% of people would be expected to feel odor annoyance.

Due to the inherent mathematical properties of the sense of smell, successive reductions in hydrogen sulfide level, which may be progressively more difficult and expensive to achieve by engineering improvements, can only produce less than proportionate, and rather un-rewarding, reductions in odor detectability, intensity and annoyance. The cost/benefit ratio will therefore escalate rapidly if the ambient standard is decreased.

It may be desired to estimate the changes that could be produced in the detectability, intensity and annoyance of hydrogen sulfide odor, due to the presence of one or other of the conditions listed in Table III. As a conjecture and approximation, it may be justifiable to multiply all the column of hydrogen sulfide levels in Table VI by the appropriate factor selected from Table III. This, in effect, displaces the log/probit curve to the right (usually). There may, however, also be a substantial change of slope, as was observed with the mis-directed test (Amoore and Hautala, 1983).

In applying an ambient air quality standard to a particular industrial operation, the aggregate odor background from all other sources in the area should be considered. Even total suppression of sulfurous emissions from one industry may not significantly reduce the odor problem in a community, unless all other man-made sources of odor in the neighborhood are equally effectively controlled. Also, any natural and irreducible background odor should be taken into account, such as hot springs, fumaroles, marsh-gas, skunks, stink-horns, etc. Just as our surroundings are seldom silent, yet we tolerate some noise, our environment is not always odorless, and we may be unreasonable to expect it to be so.

4. Regulations for ambient odors in other States. A review on the status of odor control

ATTACHMENT C

Medicine, Little Medicine, Bullseye and Blanche Lake Water Quality Data

KLAMATH ENVIRONMENTAL SERVICES
200 E. Main • Klamath Falls, OR 97601

HAZARDOUS WASTE ANALYSIS.
WATER TESTING, GROUND WATER
MONITORING, ENVIRONMENTAL CONSULTING
200 E. MAIN - KLAMATH FALLS, OR 97601 - (541) 882-8677
FAX (541) 882-7867 TOLL FREE 800-262-5993
OREGON STATE CERTIFIED LABORATORY #17
STATE OF CALIFORNIA CERTIFIED
EPA APPROVED

LABORATORY ANALYSIS
Miscelaneous Analysis
September 26, 1997

Phyllis Fox, Ph.D.
Russell Resources
2530 Etna St.
Berkley, CA 94704

(510) 843-1126

Sample Matrix: Water
Date Sampled: 9/21/97
Date Received: 9/21/97
Date Analyzed: 9/21-25/97
Analysis Units: mg/L (ppm)
Collected By : L. Halout (KES)

Lab Ref#:	EPA Method	Sample ID:	Element	Results:	MCL:
972229	150.1	Medicine Lake Site 1	pH	6.59 su	
			Temperature	15°c	
			Specific Conductance	13.6 umhos/cm	
			Alkalinity	8.08	
			Total Organic Carbon	3.5	
972230		Medicine Lake Site 2	pH	6.74 su	
			Temperature	15.5°c	
			Specific Conductance	14.2 umhos/cm	
			Alkalinity	7.07	
972231		Little Medicine Lake Site 1	pH	6.74 su	
			Temperature	16.4°c	
			Specific Conductance	23.8 umhos/cm	
			Alkalinity	12.52	
			Total Organic Carbon	4.7	

Lab Ref#:	EPA Method	Sample ID:	Element	Results:	MCL:
972232		Little Medicine Lake Site 2	pH	6.88 su	
			Temperature	18.1°c	
			Specific Conductance	24.4 umhos/cm	
			Alkalinity	11.72	
972233		Blanche Lake Site 1	pH	6.97 su	
			Temperature	18.8°c	
			Specific Conductance	9.1 umhos/cm	
			Alkalinity	5.05	
			Total Organic Carbon	5.0	
972234		Blanche Lake Site 2	pH	7.02 su	
			Temperature	19.1°c	
			Specific Conductance	9.0 umhos/cm	
			Alkalinity	5.45	
972235		Bullseye Lake Site 1	pH	6.66 su	
			Temperature	14.2°c	
			Specific Conductance	13.1 umhos/cm	
			Alkalinity	6.67	
			Total Organic Carbon	4.8	

Lab Ref#:	EPA Method	Sample ID:	Element	Results:	MCL:
972236		Bullseye Lake Site 2	pH	6.70 su	
			Temperature	15.5°c	
			Specific Conductance	13.3 umhos/cm	
			Alkalinity	7.07	

Comments: pH, temperature and specific conductance were determined on the field on 9/21/97 between 4:00 pm 5:00 pm.

Reviewed and Approved by:

Lee Halout

Laboratory Supervisor

ATTACHMENT D

ALOHA Modeling of 1-ton Chlorine Cylinder Release

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 3 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 0 feet from tank bottom
Release Duration: 17 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.5 kilograms/min
(averaged over a minute or more)
Total Amount Released: 907 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 3 ppm
Max Threat Zone for LOC: 3.9 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 10 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 0 feet from tank bottom
Release Duration: 17 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.5 kilograms/min
(averaged over a minute or more)
Total Amount Released: 907 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 10 ppm
Max Threat Zone for LOC: 2.0 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 20 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 0 feet from tank bottom
Release Duration: 17 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.5 kilograms/min
(averaged over a minute or more)
Total Amount Released: 907 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 20 ppm
Max Threat Zone for LOC: 1.3 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 3 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 1.25 feet from tank bottom
Release Duration: 36 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.8 kilograms/min
(averaged over a minute or more)
Total Amount Released: 345 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 3 ppm
Max Threat Zone for LOC: 3.0 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 10 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 1.25 feet from tank bottom
Release Duration: 36 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.8 kilograms/min
(averaged over a minute or more)
Total Amount Released: 345 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 10 ppm
Max Threat Zone for LOC: 1.7 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 20 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 1.25 feet from tank bottom
Release Duration: 36 minutes
Max Computed Release Rate: 59 kilograms/min
Max Average Sustained Release Rate: 58.8 kilograms/min
(averaged over a minute or more)
Total Amount Released: 345 kilograms
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 20 ppm
Max Threat Zone for LOC: 1.2 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 3 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 2.5 feet from tank bottom
Release Duration: ALOHA limited the duration to 1 hour
Max Computed Release Rate: 8.92 kilograms/min
Max Average Sustained Release Rate: 7.97 kilograms/min
(averaged over a minute or more)
Total Amount Released: 145 kilograms
Note: The chemical escaped from the tank as a gas.

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 3 ppm
Max Threat Zone for LOC: 1.7 kilometers

ALOHA 5.2

SITE DATA INFORMATION:
Location: FOURMILE HILL, CALIFORNIA
Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
Time: July 28, 1997 0600 hours PDT (User specified)

CHEMICAL INFORMATION:
Chemical Name: CHLORINE Molecular Weight: 70.91 kg/kmol
TLV-TWA: 0.5 ppm IDLH: 10 ppm
Footprint Level of Concern: 10 ppm
Boiling Point: -34.03° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
Wind: 2 meters/sec from n at 10 meters
No Inversion Height
Stability Class: F Air Temperature: 50° F
Relative Humidity: 50% Ground Roughness: 70 centimeters
Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
Leak from short pipe or valve in horizontal cylindrical tank
Tank Diameter: 2.5 feet Tank Length: 6.8 feet
Tank Volume: 250 gallons Tank contains liquid
Internal Temperature: 50° F
Chemical Mass in Tank: 1 tons
Tank is 66% full
Circular Opening Diameter: .5 inches
Opening is 2.5 feet from tank bottom
Release Duration: ALOHA limited the duration to 1 hour
Max Computed Release Rate: 8.92 kilograms/min
Max Average Sustained Release Rate: 7.97 kilograms/min
(averaged over a minute or more)
Total Amount Released: 145 kilograms
Note: The chemical escaped from the tank as a gas.

FOOTPRINT INFORMATION:
Model Run: Heavy Gas
User-specified LOC: 10 ppm
Max Threat Zone for LOC: 817 meters

ALOHA 5.2

```
SITE DATA INFORMATION:
  Location: FOURMILE HILL, CALIFORNIA
  Building Air Exchanges Per Hour: 0.35 (Sheltered single storied)
  Time: July 28, 1997  0600 hours PDT (User specified)

CHEMICAL INFORMATION:
  Chemical Name: CHLORINE          Molecular Weight: 70.91 kg/kmol
  TLV-TWA: 0.5 ppm                 IDLH: 10 ppm
  Footprint Level of Concern: 20 ppm
  Boiling Point: -34.03° C
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
  Wind: 2 meters/sec from n at 10 meters
  No Inversion Height
  Stability Class: F               Air Temperature: 50° F
  Relative Humidity: 50%           Ground Roughness: 70 centimeters
  Cloud Cover: 0 tenths

SOURCE STRENGTH INFORMATION:
  Leak from short pipe or valve in horizontal cylindrical tank
  Tank Diameter: 2.5 feet          Tank Length: 6.8 feet
  Tank Volume: 250 gallons         Tank contains liquid
  Internal Temperature: 50° F
  Chemical Mass in Tank: 1 tons
  Tank is 66% full
  Circular Opening Diameter: .5 inches
  Opening is 2.5 feet from tank bottom
  Release Duration: ALOHA limited the duration to 1 hour
  Max Computed Release Rate: 8.92 kilograms/min
  Max Average Sustained Release Rate: 7.97 kilograms/min
     (averaged over a minute or more)
  Total Amount Released: 145 kilograms
  Note: The chemical escaped from the tank as a gas.

FOOTPRINT INFORMATION:
  Model Run: Heavy Gas
  User-specified LOC: 20 ppm
  Max Threat Zone for LOC: 540 meters
```


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EDUCATION

Ph.D.: Civil/Environmental Engineering, University of California, Berkeley, 1980.

M.S.: Environmental Engineering, University of California, Berkeley, 1975.

B.S.: Physics (with high honors), University of Florida, Gainesville, 1971.

Registration: Environmental Assessor in California (#REA-00704).

PROFESSIONAL EXPERIENCE

Consulting Engineer
2530 Etna Street
Berkeley, California 94704
May 1981 - Present

Russell Resources, Associate
950 Northgate Drive, Suite 313
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March 1988 - Present

Engineering consultant in environmental management with emphasis on toxic and hazardous waste, air quality, water quality, and water resources. Preparation and review of environmental impact reports, risk assessments, air and water permit applications, work plans, closure plans, remedial investigations, feasibility studies, site assessments, facility audits, and other environmental documentation. Environmental permitting. Litigation support and expert testimony. Statistical analyses and computer simulations. Design and evaluation of environmental monitoring programs. Investigations have been completed for a wide range of facilities including reformulated fuels projects, refineries, landfills, railyards, hazardous waste treatment facilities, oil shale plants, asphalt plants, incinerators, cogeneration plants, airports, hydrocrackers, hydrogen plants, tank farms, printed circuit board manufacturers, lanthanide processing plants, ammonia plants, urea plants, food processing plants, paint formulation plants, wastewater treatment plants, sulfur recovery plants, a wide range of mines including sand and gravel, limestone, nacholite, coal, gold, zinc and oil shale, and enhanced oil recovery operations, among others.

Principal Investigator
Lawrence Berkeley Laboratory
Berkeley, California 94720
August 1977 - April 1981

Developed, directed, and participated in a broad-based research program on environmental issues and control technology for energy industries including petroleum, oil shale, coal mining, and coal slurry transport. Research included evaluation of air and water pollution and development of novel, low-cost technology to treat and dispose of wastes. The program consisted of government and industry contracts and employed 45 technical and administrative personnel.

Project Manager
University of California
Berkeley, California 94720
July 1976 - August 1977

Directed and participated in research on environmental impacts of energy development in the Colorado River Basin.

Engineer
Bechtel, Inc.
San Francisco, California
September 1971 - August 1976

Performed engineering and modelling studies on surface and ground water contamination, air pollution, thermal pollution, eutrophication, industrial waste treatment, and solid waste disposal for a variety of domestic and international projects. Played a major role in Northern California water resource planning studies. Coordinated a high-level task force established to investigate corrosion/erosion-type failures of nuclear power plants. Developed and applied numerical models of water treatment processes, ground water systems, estuaries, and river systems. Developed several large-scale data management systems for environmental monitoring data.

PROFESSIONAL SOCIETIES

Society of Environmental Toxicology and Chemistry

American Water Resources Association

American Chemical Society

Phi Beta Kappa

Sigma Pi Sigma

MISCELLANEOUS

Who's Who Environmental Registry, PH Publishing, Fort Collins, CO, 1992.

Who's Who of American Women, Marquis Who's Who, Inc., Chicago, IL, 13th Ed., p. 264, 1984-present.

Guide to Specialists on Toxic Substances, World Environment Center, New York, NY, p. 80, 1980.

Member, National Research Council Committee on Irrigation-Induced Water Quality Problems (Selenium), Subcommittee on Quality Control/Quality Assurance (1985-1990)

Member, National Research Council Committee on Surface Mining and Reclamation, Subcommittee on Oil Shale (1978-80)

PUBLICATIONS

Over 50 publications on environmental chemistry and water resources.

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September 29, 1997

Ms. Erin Mahaney
Adams Broadwell & Joseph
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

RE: Review of Fourmile Hill Geothermal Development Project; Environmental Impact Statement/Environmental Impact Report

Dear Ms. Mahaney:

At your request we have reviewed the Draft EIS/EIR for the Fourmile Hill Geothermal Development Project. We find that the document is fundamentally flawed in that it does not establish: (1) a description (qualitative and quantitative) of how the project generates impacts, (2) a proper frame of reference for assessing the impacts, or (3) a quantitative analysis of receptors and receptor sensitivity to impacts. The organization of the document is backwards: sensitive receptors are defined irrespective of their relationship to project components and then the document attempts to relate the project to the receptors. Consequently, the document spends most of its time discussing impacts that are less-than-significant, leaving the reader unclear about what are the truly significant impacts of the project that should require mitigation, or whether alternatives would substantially avoid or reduce impacts. AG.265

The purpose of an EIS or EIR is to inform the public about the significant impacts of a project; this document fails to provide that information. For example, the EIS/EIR fails to provide sufficient information about wildlife and vegetation that will be affected by the project. The EIS/EIR's findings that the project will not significantly affect the environment are unsupported by adequate data. The EIS/EIR repeatedly proposes vague and unenforceable mitigation measures and it proposes mitigation that actually constitutes deferred impact assessment. AG.266

These failings are rampant throughout every section of the document we reviewed. Many specific examples are given below under our discussion of the individual resources. The lack of a valid understanding of the difference between significant and less-than-significant impacts in the document renders its list of mitigation measures essentially worthless. We believe the document must be substantially revised and re-circulated for public review.

A Comprehensive Approach to Impact Assessment

Before providing comments on the inadequacies of the EIS/EIR, it is helpful to consider how a proper impact assessment should be conducted. The project itself should first be carefully delineated, *as an impact generator*, which also includes the definition for each project component and environmental factor, and the zone in which there could be significant impacts. Then the project should discuss which potentially sensitive receptors are actually located within the zone where significant impacts could be felt. The combination of a certain level of impact within a certain zone *and* the presence of receptors within the zone together constitute a significant impact requiring mitigation.

The project has three primary components — power plant, well field, and transmission line — each of these produces a distinct set of potential impacts on environmental resources. The location for the power plant and well field are relatively fixed by the location of the geothermal resource while the transmission line can occupy any one of several alternate routes. Thus, for the well field and power plant, mitigation (onsite or compensatory) may be the primary means of reducing impact, while for the transmission line, impact may be avoidable by selection of an alternate route. This point needs to be made clear from the start of the analysis.

To assess impact, then, each component of the project should be described in detail as to how it produces impact. The following matrix may be helpful. It is meant to be illustrative only, not comprehensive. It addresses some impacts of construction of the power plant. After understanding how the project produces impact, one can then define a zone or zones where the impact may be felt (e.g. onsite, immediately adjacent, within 500 feet away, one-quarter mile away, one-half mile away, 1 mile, 1-5 miles, beyond 5 miles etc.). For example, some impacts may be significant only in the closest zone or zones, others may be significant as far away as a mile. Some impacts may be perceptible at greater distances, but only significant at near distances. This is what is meant by the frame of reference.

In addition, the significance of impact is guided by the nature of the receptors, their sensitivity to impact, and features which may reduce potential impacts. For example, hikers in the nearby forest may see the power plant or hear noise from well field operation. But to determine whether this is a significant effects requires (1) a *quantification* of receptor numbers (e.g. the number of hikers -- 10 hikers a month is not significant, but 500 would be), (2) *distance from the impact generator* -- whether they are close enough to the site to even notice the noise, and (3) *impact reduction features* -- whether intervening vegetation or topographic features would block their view of the plant site or steam plumes. The discussion of impacts in the EIS/EIR, in many instances, is pure conjecture and does not give any information with regard to significance because it does not provide an analysis according to the above criteria which serve to discriminate between significant and non-significant effects.

AG.267

MATRIX OF IMPACT GENERATORS, ZONES AND RECEPTORS

POWER PLANT IMPACT GENERATORS	EXAMPLES OF DISCIPLINES AFFECTED/ MEASUREMENT TO BE REPORTED IN EIR	EXAMPLES OF ZONE OF POTENTIALLY SIGNIFICANT IMPACT	EXAMPLES OF SENSITIVE RECEPTORS WITHIN ZONE
Construction	Geology and soils (grading, erosion and slope stability)	Construction site	
	Hydrology (sedimentation)	Watershed downstream of site	Aquatic life (fish, invertebrates) potentially affected by changes in water quality
	Noise (noise levels emitted by all equipment)	Areas within 1 mile of construction sites	Recreationists; Traditional cultural resource users; Residences (if any);
	Air Quality (dust, vehicular emissions)	Zone downwind of work site	Residences (if any); workers
	Vegetation (area of disturbance or vegetation removal)	Work site; access roads; equipment storage areas	Special status plant species; plant communities
	Wildlife (vegetation removal, noise, activity)	Work site; access roads; zone of noise impacts	Mule deer herd; other species using site
	Cultural Resources	Site and construction disturbance area	Significant pre-historic resources
	Traditional cultural resource values	Traditional use sites close enough to experience noise or visual impact	Significant traditional use sites identified by Native Americans

2.0 Alternatives, Including the Proposed Action

The project description appears not to include the reasonably foreseeable cumulative project which could involve upgrading or building a second line parallel to the existing BPA Malin-Warner line in order to carry the increased load.

The Draft EIS/EIR states (p. 2-38):

> "The geothermal resource at the Glass Mountain KGRA was initially calculated to have the potential to produce an estimated 550 MW of electric power."
>
> "reasonably foreseeable projects (in the Glass Mountain KGRA) would generate an estimated total net electrical power output of 90 megawatts"
>
> "The Proposed transmission line would have an effective capacity of 145 MW, although it would have a design capacity of 300 MW to the tie-in with the BPA Malin-Warner line. The reason that the effective capacity of the proposed transmission line would be limited to 145 MW is due to limitations in electrical loading capabilities of the BPA Malin-Warner transmission line."
>
> "If the electric load on the proposed transmission line were to be increased to over 145 MW, the combination of this load with moderate wintertime south-to-north power flow conditions would cause the PacficCorp transmission line system to become unstable. Since moderate wintertime conditions occur much more frequently than heavy wintertime conditions, system instability would occur much more frequently with higher electric loads".

AG.268

The combination of these points suggest that full development of the Glass Mountain KGRA geothermal resource is reasonably foreseeable and could require upgrading or duplication (doubling) of the Malin-Warner transmission line. This development would have far greater impacts than the transmission line associated only with the current Fourmile Hill project. The EIS/EIR should address the impacts of building another transmission line in the BPA Malin-Warner corridor.

4.5 Cultural Resources

AG.269

Sample Survey Appeared to Omit Power Plant Site: The Draft EIS/EIR used a methodology to characterize the potential for significant cultural resources in the

project area that involved a sample survey of the project components, including the transmission line routes. The text on pp. 3-46 - 3-47 mentions sampling of five well pads, connecting corridors, transmission line corridor segments, substations, the freshwater pipeline, and the power plant area generally. However, there is no indication that the actual power plant site was surveyed. Since this 10.4-acre site is fixed geographically there is no apparent reason why the entire power plant site should not have been comprehensively surveyed as part of the overall sample survey.

Survey of Cultural Resources Along Transmission Line Routes Should Have Been Done: The Draft EIS/EIR includes Mitigation Measure 4.5.1a (p. 4-55) that calls for a survey of cultural resources prior to commencement of surface disturbing activities, but after approval of the proposed project. Transmission facilities are to be relocated if possible, to avoid historic and pre-historic sites, and if avoidance is not feasible, to evaluate sites that are listed or eligible for listing in the National Register of Historic Places. This deferral of survey until after the EIS/EIR process is completed is contrary to the purpose of an EIS which is to select an alternative that will minimize impacts to environmental resources.

AG.270

Based on the sample survey and record search, the EIS/EIR analysis estimated the number of sites within the proposed and alternate transmission line corridors. However, this estimate is not a substitute for an actual survey because it provides no information on the relative content and value of the sites. A survey should be conducted to show the relative value of sites on each corridor, and how many sites could be feasibly avoided by flexibility in location of the facilities along each route, once that route was chosen.

Since there are so many sites potentially affected along any of the routes (i.e. 57 to 67 sites), the provision in Mitigation Measure 4.5.1a to evaluate sites which cannot be avoided prior to construction is probably impractical. The evaluation, retrieval, and archival of cultural resources is subject to a detailed protocol under the National Historic Preservation Act (Sections 106 and 110). This protocol is a multi-step process involving survey, characterization of resource value and impacts, and extensive consultation with the State Historic Preservation Office and the Advisory Council on Historic Preservation (ACHP), as well as the Native Americans. The process for so many sites would be so lengthy and expensive that it could delay the project indefinitely. This process could not be accomplished at the preconstruction stage. Therefore, this mitigation measure is unrealistic and likely would not be effective from a practical standpoint.

AG.271

The only alternative to compliance with the NHRA evaluation process is complete avoidance of impact to the sites. Therefore, the alternative routes should be surveyed prior to EIS/EIR completion so that avoidance can be factored into the selection and design of a preferred route.

4.6 Traditional Cultural Values

The analysis of traditional cultural values contains contradictory information. On p. 4-67, the Draft EIS/EIR states "the proposed transmission line route would be within approximately 500 feet of two traditional-use sites (Site #12 and Site #13)". On the very same page (two paragraphs down), the document states "In addition, five other traditional-use sites are located close to the proposed transmission line route; however, all are approximately 0.25 to 0.5 miles away from the line. The sites closest to the proposed line would be Sites #7, #8, #12, #13 and #14." Which is correct: 500 feet from Sites #12 and 13, or 0.25 to 0.5 miles (1250-2500 feet) away? This distinction is important when considering the impacts of the transmission line on the traditional use sites, particularly the visual and noise impacts. The EIS/EIR should clarify this information. AG.272

4.7 Vegetation

Special Status Plant Discussion Incomplete. The EIS/EIR does not address several listed plant species known to exist in Siskiyou County as provided in the California Dept. Fish and Game Internet site. State listed plants on the CDFG list are: Ashland's thistle, McDonald's rock cress, Trinity buckwheat, Yreka phlox, Siskiyou mariposa lily, and slender orcutt grass. The EIS/EIR should address these species if there is suitable habitat for such species in the project area. AG.273

Insufficient Basis for Finding No Significant Impacts to Fungus and Lichen. On page 4-93, the EIS/EIR states "the false truffle is a special-status fungus likely to be found in late seral forests in the project area, particularly within the well field and power plant areas. These and other fungus and lichen species mentioned in the Northwest Forest Plan may be impacted, although these potential impacts are not considered significant." The EIS/EIR should discuss the reason why these impacts are not significant. AG.274

Mitigation Measure 4.8.1d for Lost Forest is Inadequate. Mitigation Measure 4.8.1d states that "for stands of late seral stage forest lost due to project construction, compensation shall be provided by Calpine ... and could include activities such as silvicultural enhancement in the form of thinning understory or prescribing underburning techniques of an acreage equivalent to that of the project activities." It is not clear how these activities would provide compensation for loss of late seral forest because, by definition, late seral forest has taken many decades to become mature. Is the purpose of these activities to speed up the conversion of young forest to a late seral type forest? The EIS/EIR needs to state why the proposed mitigation would provide compensation for the forest lost. AG.275

Mitigation for Impacts of Well Venting on Vegetation is Deferred. On page 4-89, the last paragraph discusses impacts of well venting on vegetation. The last AG.276

sentence of the paragraph says "the effect would be adverse but not significant." However, on page 4-92, under Mitigation Measures, the EIS/EIR relies on future studies to actually determine that the impact is insignificant. The EIS/EIR cannot rely on future studies to find an impact insignificant. These studies must be incorporated in the EIS/EIR.

Mitigation Measures 4.7.1 for Vegetation are Vague and Contradictory. The mitigation measures for impacts on vegetation identified at 4.7.1 are vague and leave the reader wondering how and if the measures will actually mitigate impacts. For instance, in 4.7.1a the use of the phrase "kept to a minimum" or "minimized" is used. What does this mean? The loss of vegetation should be quantified. Mitigation measure 4.7.1.b does not clearly state what the compensation will consist of. Mitigation measure 4.7.1d seems to be in direct conflict with mitigation measures to maintain fire buffers in and around the transmission line corridors. It states that "areas cleared within the transmission line right-of-way shall be seeded or planted with native perennial grasses and low growing shrubs such as ceanothus, manzanita, and bitter brush." These latter species are highly flammable species. AG.277

Mitigation Measures for Impacts to Special Status Plant Species Should Precede Project Approval. The proposed measures in the EIS/EIR (Measure 4.7.3a, p. 4-94), which consist of carrying out floristic surveys of the transmission line corridor, well field, and power plant area, are aimed at assessing the impact, not mitigating it. This information is necessary at the EIS/EIR stage in order to: (1) quantify the impact of the project on special status species, and (2) determine which alternative transmission line would have the least impact. The mitigation measure also has dubious feasibility since the individual populations of the plants may be so extensive that they cannot feasibly be avoided. In that case, it is even more important to know which transmission line routes would best minimize unavoidable impacts to the special status plants. Since the mitigation is speculative, there is no basis for the EIS/EIR to conclude that implementation of this measure would reduce impacts on special status plants to less than significant (p. 4-94). AG.278

Mitigation Measure 4.7.4b for Wetlands is too Vague. The mitigation calls for conducting a wetlands delineation on areas of "potential wetlands" prior to construction. Such a delineation is customarily done as part of the environmental review of a project and not deferred to the mitigation stage. Based on the results of the delineation, the mitigation is then developed and would consist of habitat replacement. This mitigation leaves one wondering if and how the wetlands can be avoided, what is the nature of the wetlands, and whether they are important in the overall ecology of the area. Also the discussion in measure 4.7.4b is contradictory because it first states that "small potential wetland areas along segment C1 of the transmission line shall be avoided." Then the EIS/EIR later states that "habitat disturbance shall be minimized and construction activities shall be timed to avoid wet periods in which habitat disturbance may be greater." Which is the correct statement? AG.279

Introduction of Weedy Plants is a Significant Effect. Page 4-96 of the EIS/EIR states that "during project construction and maintenance, the seeds of weedy plants could be introduced into the project area by construction and maintenance vehicles. While the introduction of weeds would not be considered a significant effect, avoidance of weed introduction would be desirable." Why is the introduction of weedy plants not considered a significant effect? Prevention of the spread of exotic pest plants into previously pristine habitats is major goal of the California Native Plant Society and the California Exotic Pest Plant Council. The mitigation measure for this impact (4.7.5a) should include more details on the post-construction monitoring protocol so that its adequacy can be evaluated. We recommend that any invasive pest plants that become established in the area should be subject to control throughout the 45-year life of the project and beyond, if necessary. AG.280

Mitigation Measure 4.3.3e for Transmission Line Revegetation is Inadequate. Mitigation Measure 4.3.3e, p. 4-30, states: "Calpine shall seed as recommended by USFS the area of the transmission line right-of-way disturbed during construction with low-growing native plants if such plants do not naturally revegetate the area within three years." The mitigation measure is inadequate because it does not explain why the area would be expected to revegetate within three years. If there is sufficient soil erosion and loss of topsoil during the construction period, the disturbed area may be unable to revegetate. Three years is too long to wait to commence artificial planting, because if natural revegetation is too slow, additional erosion can occur that will make revegetation of the disturbed sites increasingly difficult. The mitigation measure should be revised to state that if revegetation does not meet certain criteria (e.g., USFS criteria for plant cover, density and height, if such exist) by the beginning of the growing season in the second year, then natural revegetation will be supplemented with artificial seeding or planting until the criteria are met. AG.281

In addition, the EIS/EIR should first prove that the USFS believes that natural revegetation is feasible by quoting the guideline or regulation that states what the USFS requirements actually are for seeding disturbed areas or for allowing natural revegetation to take place. Second, the USFS guidelines may contain other measures which encourage natural revegetation such as sediment traps or salvage of topsoil that contains seeds. The EIS/EIR needs to demonstrate that if USFS procedures are followed, the areas disturbed by construction are likely to revegetate naturally within the first year so that additional erosion will not occur.

4.8 Wildlife

Failure to Substantiate Conclusion of No Significant Habitat Impacts. The EIS/EIR finds that habitat impacts may not be significant, but it does not demonstrate why this may be true. Figure 3.7-1 does not show the continuation of the habitat types into the areas adjacent to the project. The EIS/EIR does not discuss the relative value of the habitats. We do not know the regional context of how many AG.282

acres of contiguous red fir forest there are locally or in the sub-region, or how important this particular patch of relatively undisturbed red fir forest is to wildlife species, or if it is one of the few areas providing "late seral values." Since the late seral forest is the habitat of the northern spotted owl, a federally listed threatened species, the EIS/EIR needs to also consider the disproportionate impact removal of late seral forest (e.g. 21.7 acres of red fir forest and 84.7 acres of upper montane mixed conifer forest (Table 4.7-1, p. 4-85)) will have on the northern spotted owl. Without more information about habitat, we don't know what the Project's true impact would be on wildlife.

Transmission Line Collisions Will Significantly Affect Birds. The most significant effects on wildlife may be those of introducing an industrial use into a relatively undisturbed wildlife area, not the mere removal of habitat. For example, the transmission line will likely result in a significant effect from bird collision with wires. Mitigation Measure 4.8.4a, p. 4-126, regarding balls and markers, has been shown to be of limited effectiveness in reducing impact because the balls and markers are not visible during nighttime hours or under cloudy and inclement weather conditions when many birds could be flying across the area (James and Haak, 1979). The imposition of 24 miles of high voltage transmission line across any part of this area creates an unavoidable increase in avian mortality (including deaths of listed and sensitive species) and would be a significant, unmitigatable impact. AG.283

Page 4-125 of the EIS/EIR states: "The highest potential for bird collisions exists along the portion of segment A1 located near Medicine Lake. The species most likely to be affected would be bald eagles and ospreys, both of which frequently engage in flight activity in the vicinity of this transmission line segment." Alternative transmission line segment B1 reduces impacts on birds (from collisions), but the use of this alternative is not included as a mitigation measure. This measure should be discussed.

EIS/EIR Misunderstands Concept of Disturbance to Animals. The EIS/EIR states (p. 4-112) that during the construction phase wildlife would not experience adverse physiological effects from high noise levels because the temporary human activity and moving machinery would cause wildlife to avoid construction sites during these periods. This statement shows a lack of understanding of the impact to wildlife and of assessing potential impacts to wildlife. The reason wildlife would leave the area is because of the noise and disturbance associated with construction. The act of leaving the area itself indicates that there has been an impact to the wildlife caused by the noise and construction activity. The act of displacement itself may indicate that the wildlife have in fact experienced adverse physiological effects, as well as potential disruption of mating or foraging, interference with territorial behavior. The EIS/EIR should fully evaluate this impact and mitigation measures. AG.284

Contradictory and Inadequate Discussion of Interference With Animal Migration Routes. The EIS/EIR states that "wildlife would be expected to temporarily avoid sites at which construction and well drilling are in active progress, maintaining AG.285

distances of 200 to 400 feet from these sources of noise and disturbance." (p. 4-112.) However, the EIS/EIR also states (p. 4-122) that "the existence of project facilities would not interfere with migration routes for special status wildlife species...Adequate space would exist under the transmission line for the free movement of wildlife species...Production pipelines would be elevated approximately 3 to 6 feet above ground on stansions, and wildlife would be able to move freely underneath." These two statements appear contradictory. If wildlife are avoiding the project area during construction due to noise, physical activity and disturbance, why would wildlife be expected to move freely through the area during operations, when they would still be subjected to noise, and activities of personnel? The EIS/EIR needs to resolve this contradiction.

In addition, the EIS/EIR does not address the real issue of whether the area occupied by the project site is actually on any important migration routes for wildlife species. The power plant and well field area contain over a mile of production and injection pipelines in the east-west direction and two sets of pipelines, about one-half to one mile in length, in the north-south direction. The EIS/EIR must determine whether the project site is on any migration routes before an assessment of impacts to animal migration can be made.

Impacts to Mule Deer Not Adequately Addressed. The EIS/EIR discusses the issue of interference with animal migration routes on p. 4-122. The EIS/EIR states that the roads used for project operation would not pose barriers to movement of species such as mule deer and pronghorn. The EIS/EIR, however, does not discuss the impact of construction of project facilities on mule deer migration. The Deer Habitat Map from the USDA Forest Service *Environmental Assessment for Geothermal Leasing* (1981) shows a major deer migration corridor which appears to go right through the proposed power plant and well pad area. The EIS/EIR should describe the effect that 18 to 36 months of construction will have on the migrating deer herd since the herd will be expected to avoid the construction area during this time, or perhaps permanently. AG.286

The EIS/EIR includes mitigation 4.8.3m (p. 4-125), which prohibits construction or decommissioning activities between December 1 and March 31, for impacts to the mule deer winter range. Based on the information in the USDA Forest Service *Environmental Assessment for Geothermal Leasing* (1981), the critical period of use is from November 1 through May 1, so the period of prohibition should be extended to encompass this larger period.

Current Species Range is Relevant to Impacts. The EIS/EIR does not provide enough specific information on species to get an idea of the current range and distribution of the species. Given that the EIS/EIR says that impacts on species are considered not significant because the population impacted is such a small part of the overall population, much more detailed data should be provided for these species. In particular, species range maps should be provided. Specifically this is true for: Hall's sedge, sugar stick, gray penstemon, and volcanic daisy (page 4-93); blue grouse, AG.287

cooper's hawk, golden eagle, hairy woodpecker, loggerhead shrike, pileated woodpecker, sage grouse, Swainson's hawk, pallid bat, Townsend's big-eared bat, American badger, American martin, mule deer, Oregon snowshoe hare, and pronghorn sheep (pages 4-114 to 4-120).

Two Listed Species Were Omitted from Analysis. The EIS/EIR does not address two state listed animal species which have known ranges in or near the project site. These were included in the California Dept. Fish and Game Internet site (www.dfg.ca.gov/Endangered/SIS.html). These are the California Wolverine (California threatened and fully protected) and the Sierra Nevada red fox (California threatened) (species accounts attached). The EIS/EIR should include a description of these animals, their habitat requirements, and surveys of the animals if they have the potential to be impacted by the project. AG.288

Riparian Reserve Areas Should be Mapped. In the description of regional overview in the wildlife section (p. 3-98 to 3-99) the EIS/EIR states that there is "little surface water, few permanent streams or riparian habitats, and few springs, meadows, or wetlands." However, in Section 5 of the document, on page 5-6, mitigation measure 4.3.5a states "Calpine shall not site transmission line structures and access roads (except road crossings) within Riparian Reserve areas as delineated by the USFS". There is no discussion in the vegetation or wildlife sections of these Riparian Preserve areas. AG.289

Assessment of Access Roads Impact on Wildlife Inadequate: Page 4-109 of the EIS/EIR states that "new roads associated with the transmission line could provide the public with access to portions of the project area that were previously inaccessible. If the public were to access these areas, any disturbance of wildlife would be expected to be temporary and sporadic, and would not be expected to significantly affect any wildlife species in the area." This impact assessment is totally inadequate. Some public activities can be very damaging to the environment and can cause significant impacts to wildlife. These must be discussed in the EIS/EIR. There should be a discussion of where the new roads will be located, what areas the roads will allow access to, and what type of activities the public will conduct on these new roads (i.e. four-wheel driving, camping, hunting, etc.) After an adequate description of the potential impacts is provided, then appropriate mitigation measures can be recommended. For example, maybe the new roads should be gated and closed to public access. AG.290

Mitigation Measures are Vague. On page 4-110, the discussion of mitigation measures 4.8.1 should be expanded and clarified so that the reader can fully understand the mitigation and evaluate whether the mitigation reduces the impacts to a level of insignificance. Just saying something will be minimized or compensation shall be provided is inadequate. For instance, in measure 4.8.1c the mitigation is to locate "transmission line facilities in areas such as log decks, previously logged forest stands, and areas of small class-size trees, whenever possible." What if it is not possible? Then this is not a mitigation. The mitigation discussion leaves the reader AG.291

uncertain about whether the mitigation will be effective.

Failure to Discuss Relevant Species Mitigation Guidelines. The EIS/EIR does not discuss specific species guidelines where they exist. For example, there are specific guidelines pertaining to mitigation for impacts to the Swainson's hawk, a California threatened species. The "Guidelines" are contained in the "Staff Report regarding Mitigation for Impacts to Swainson's Hawks in the Central Valley in California," which was prepared by the California Dept. of Fish and Game, dated November 1, 1994. However, these guidelines are not mentioned (page 4-120) even though the site contains suitable foraging habitat and potential nesting habitat for the hawk.

The Swainson's hawk mitigation listed on page 4-124 of the EIS/EIR is not consistent with that recommended in the "Guidelines." The EIS/EIR states that if any Swainson's hawks nests are found within 0.25 miles of the transmission line corridor, then disturbance should be avoided from March 1 to July 31 (measure 4.8.3.g). The "Guidelines" recommends a nest avoidance period of March 1 to September 15, or August 15 if a Management Authorization of Biological Opinion is obtained for the project. AG.292

In addition, the "Guidelines" include mitigation for loss of foraging habitat, which the EIS/EIR does not include even though the EIS/EIR states that "about 20 acres of foraging habitat suitable for the Swainson's hawk would be lost along segment C1 due to transmission line construction." (Page 4-118.) Mitigation for foraging habitat is specified on pages 11 and 12 of the "Guidelines" document.

There is no mitigation for loss of foraging habitat for many of the other sensitive bird species (p. 4-122). Mitigation similar to that recommended in the Swainson's hawk Guidelines should be recommended for other sensitive bird species where there is a loss of foraging habitat.

Construction and Operational Noise Impacts on Wildlife Are Not Adequately Addressed. The EIS/EIR describes a three-year period of noise disturbance as being temporary and therefore not significant. However, according to the Noise Pollution Clearinghouse FACT SHEET on Noise Effects on Wildlife, "the study of animal response to noise is a function of many variables including characteristics of the noise and duration, life history characteristics of the species, habitat type, season and current activity of the animal, sex and age, previous exposure and whether other physical stressors (e.g. drought) are present (Manci, et al., 1988)." The FACT SHEET further states that "behavioral and physiological responses have the potential to cause injury, energy loss (from movement away from noise source), decrease in food intake, habitat avoidance and abandonment, and reproductive losses (National Park Service, 1994). Studies have shown that when certain bird species are flushed from nests in response to noise, eggs are broken and young are exposed to injury and predation (Bunnell et. al., 1981; Gladwin, 1987)." Some of the animals impacted in the Project area have short life spans and are only active in the summer and fall AG.293

months when the noise would occur. For these species, three years is not temporary. The EIS/EIR should fully evaluate noise impacts on these species.

The mitigation for noise impacts on wildlife is too vague. More details about noise reduction measures should be added. Also, since operational noise could affect wildlife throughout the life of the project, nest surveys for birds of concern should be carried out each year in operational noise impact areas.

Failure to Address Take of Endangered Species. The project clearly has the potential to take (kill, harass, harm) listed endangered species. The EIS/EIR addresses loss of habitat for listed species, but not actual take of individuals. The EIS/EIR should identify whether the project will be subject to a federal Endangered Species Act Section 7 consultation between the U.S. Forest Service and the U.S. Fish and Wildlife Service that will address take and mitigation for take of listed species. AG.294

The EIS/EIR also does not discuss the potential need for a management authorization under Fish and Game Code section 2081 for any California listed species.

Many Impacts of Transmission Line Corridor Not Addressed. In addition to loss of habitat, the EIS/EIR should also discuss other impacts associated with the transmission line corridors. The corridor may provide a migration corridor for some animals, but the existence of the corridor also creates more forest "edge" and fragments the habitat. The creation of this opening could increase predation on some species (e.g. raptor predation on small mammals). Also, hunting is allowed in these national forest areas. If hunting is allowed within the transmission line corridor, it could increase hunting pressure on game species or encourage illegal hunting. These effects should be discussed and mitigation measures should be proposed. AG.295

Mitigation of Sump Impacts on Birds. The EIS/EIR does not discuss the impacts of the sumps on birds. The EIS/EIR states: "Liquid wastes produced during well drilling consist of water, non-toxic drilling additives, rock cuttings and geothermal fluid...The liquid fraction would be directed to a lined sump with an impermeable clay or artificial liner..." (p. 4-33.) Figure 2.2-4 of the EIS/EIR (p. 2-13) shows that the lined sumps at each well pad would be 120' x 120' x 10' deep. This is 14,400 square feet, or about 1/3 or an acre. Many species of birds are attracted to water features and would land on the sumps. The EIS/EIR should discuss the composition of the liquid waste and other materials in these sumps and its impacts on birds. In particular, there may be solids in the liquid fraction that would form a scum or sticky substance at the edge of the sump in which birds could become trapped. In addition, when there is a well blowout, the emergency plan is to pump the geothermal injection brine to the sumps (p. 4-283). This brine contains high levels of heavy metals and other substances which could be toxic to birds which might regularly roost on the ponds. AG.296

If there is an adverse impact on birds, then a mitigation measure should be proposed to prevent birds from landing on the ponds, such as the type of fine netting that is used to prevent birds from landing on industrial waste ponds and sewage ponds.

4.9 Visual Quality

Improper Methodology Used to Assess Impacts. The Draft EIS/EIR uses an incorrect, and essentially meaningless methodology to assess visual impacts. The Draft EIS/EIR states that the analysis was conducted in compliance with the USFS Visual Management System (VMS) and updated to reflect the concepts of the USFS Scenery Management System. The Draft EIS/EIR also states that the terminology used in this analysis is consistent with that used in the VMS and SMS. The Draft EIS/EIR goes on to say (P. 4-135) that "this evaluation is based on an assessment of visible project elements from surrounding Key Observation Points (KOPs) in the region."

Page 3-120 states that "the term 'Key Observation Point' is a designator used in the field of visual resource assessment to identify view points of public significance within a given region. This term, however, is not a formal designation that is defined or regulated by Federal or state agencies." These two statements just quoted are contradictory. How can the term (or use of KOPs) be consistent with that used in VMS and SMS if the term is not a formal designation of either of these agencies? Is the KOP methodology one that was invented by the consultant? If so, this should be stated. AG.297

In any case, the KOP methodology appears inappropriate for understanding the visual impacts of the project. In the first place, Table 3.9-1 which lists the KOPs, their view characteristics and direction, appears to bear no relationship to the distance of these view points from components of the proposed project. The table does not even list the distance of each of these KOPs from the relevant project components. Table 4.9-1 of the Visual Impact section lists whether the project components would be visible or not visible from the 21 KOPs but conveys no real information of the actual visual impact (e.g. the distance from the KOP to the component, how dominant the project component would be in the view).

The analysis should be re-done the other way around — that is, the zone of impact should be defined by the zone of visibility of the project components, not pre-selecting the view points first and evaluating these in relation to the project. The restructured analysis would then show what land uses, including KOPs were located within the visibility zones at increasing distances from the project facilities.

A meaningful visual impact methodology for transmission lines would define a series of visibility zones. For example, the following methodology was used in a prior

EIS/EIR on a 500 kv transmission line in southern California.[1] In the closest zone (0-300 feet) transmission line structures will be visible in almost any foreground, and could be higher than nearby trees. The structures and the line itself would be dominant in the viewer's foreground view. From 300 to 800 feet, towers diminish in relative height so that they can be obscured by trees (30 to 40 feet tall). From 800 to 1500 feet, towers are highly noticeable, but only in longer views afforded in open vistas along roads, above scrub or between sparsely spaced trees. From 1500 to 2500 feet, the tower takes on the scale of a passing automobile or pedestrian (if features such as this could be seen). At 2500 feet, the structures may still be visible but would no longer dominate the landscape, being smaller than other objects close by. Beyond 5000 feet (i.e. 1 mile), the visual impact is essentially nil. Even though transmission line structures and roads can sometimes be seen, they are so faint they can not be thought to meaningfully detract even from a pristine landscape. This zone methodology should have been used to delineate project impact.

Conflict with VQOs. All project components will conflict with the VQO's.

Figure 3.9-2 presents VQO designations along alternative transmission line routes, but the EIS/EIR presents no quantitative comparison of the difference between alternatives with respect to the categories of VQO sensitivity. The EIS/EIR should quantify the acreage of land that would be in conflict with each VQO designation for the power plant/well field area, and the extent (miles) along each alternative transmission line route that would affect each category of VQO designation. AG.298

The height of structures, according to the Draft EIS/EIR (p. 2-39 through 2-41) would be 60 to 80 feet for wood pole H-frame structures, 60 to 80 feet for guyed three-pole structures used at angle points, and 65 to 95 feet for single-pole structures. The spacing between poles on the multiple-pole structures would be 19.5 feet.

The Draft EIS/EIR claims that alternative transmission line routes will mitigate these impacts, but fails to substantiate that conclusion. Page S-12, (4th paragraph--Unavoidable Adverse Effects, last sentence), states that "The visual effect would be avoided by alternatives". Which alternative(s)? In addition, page 4-162 (2nd and 3rd paragraphs), states that the level of significance from visual impacts after mitigation from the Medicine Lake shoreline and from the Medicine Lake Lava Flow Trail would remain significant and avoidable. Please reconcile. AG.299

Steam Plumes. Page 4-139 (3rd paragraph, 5th line), and page 4-145 (4th paragraph, 2nd line) both state that the "visibility of ...steam plumes ... would be considered an adverse visual impact". However, Page 4-145 (4th paragraph, 3rd sentence) states that "this impact would not be significant, as the visibility of steam plumes would not AG.300

[1] USDA Forest Service and California Public Utilities Commission (1982-1986). *Devers-Valley 500 KV, Serrano-Valley 500 KV and Serrano-Villa Park 220 KV Transmission Line Project EIS/EIR.*

result in a long-term inconsistency with the VQO of Retention which covers the power plant site, due to periodic visibility and ephemeral nature of such plumes.

However, page 3-125, 4th paragraph, states that the **Retention** visual quality objective "provides for management activities which are not visually evident. Activities may only repeat form, line, color or texture common to the characteristic landscape, but must remain visually subordinate to the characteristic landscape".

The visual simulation methodology depicted on page 4-137, last paragraph, 6th line states that the cooling tower steam plumes would extend "approximately 110 feet in height above the cooling tower and 375 feet in length" and took into account topographic elevation of the power plant site and the height of the cooling tower.

Page 4-139, 2nd paragraph, 3rd line, states that "during winter, the average plume height could ...extend 250 feet above the cooling tower, with a length of 930 feet.", and "cooling tower steam plumes could be visible year round, depending upon atmospheric conditions".

Further, the last sentence in the 2nd paragraph on Page 4-139 states that "plume visibility is typically ephemeral, due to dispersion". Because the Medicine Lake Highlands is a heavily wooded mountainous area, above 4000 feet in elevation, (page S-11, 5th paragraph, 2nd line) it can be expected that the nighttime temperatures even in summer dip to between 30-40 degrees (f), and daytime temperatures in the summer may not rise until midday, when the sun is high in the sky. Steam plumes would be visible in the sky at these temperatures.

The steam plumes, which originate approximately only 2 miles away from Medicine Lake, and which may be 250 feet high and 930 feet long would be "significant", per the significance criteria, especially in an area with a *Retention* VQO. The mitigation proposed for the steam plume (4.9.2b) is to design cooling towers to minimize the size of the steam plume. Table S-5 finds that the only visual impact that would remain significant after mitigation is the effect on Medicine Lake views. There is no analysis in the EIS/EIR to support this conclusion. The steam plume would have a significant visual impact on more than just Medicine Lake, and there is no analysis in the EIS/EIR showing how it would be feasible to design cooling towers to reduce the steam plume, or how this would reduce its visual impact to less-than-significant. Furthermore, the steam plume would be such a pervasive visual feature in the sky over a wide area that the impact would remain significant after mitigation.

Lighting. Page 4-139 (5th paragraph), states that "the turbine building would extend approximately 45 feet above the forest canopy". There is no mention here how high the cooling tower would be. According to another section of the EIS/EIR, the cooling tower would be 70 feet tall (p. 2-28). The turbine building would be 92 feet tall (p. 4-148). Thus, the cooling tower should also extend above the forest canopy. The AG.301

EIS/EIR did not discuss impact of cooling tower or turbine building lights our what view zones would be impacted.

The Impact of Switchyard Lighting is not Analyzed. The last sentence of Page 4-139, 5th paragraph states that "brilliant switchyard lighting" will be "positioned at the upper levels of the forest canopy" How high above the canopy will this lighting extend? There is no mention of the types of "brilliant switchyard lighting", nor how brilliant these lights will be. There is no discussion of the zone of impact from this switchyard lighting. AG.302

The EIS/EIR Mis-states the Impact of Drill Rig Mast Lighting. The Draft EIS/EIR (p. 4-145) discusses the visibility of drill mast lighting. Page 4-139 (4th paragraph), states that Drill Rig Mast Lighting "would be along the full length of drill rig masts...140- to 145-feet tall" and "operated on a 24-hour basis when in use." Page 4-145 (4th paragraph, 3rd line), states that "this impact would not be significant as the visibility of well field operations would be consistent with the VQO of Modification." How can drill rig masts, which are up to 145 feet tall and lighted on a 24-hour basis, be consistent with the VQO of Modification, especially when this VQO is defined as "activities of vegetative and landform modification must borrow from the naturally established form, line, color and texture *so completely and at such a scale that their visual characteristics are those of natural occurrences within the surrounding area or character type*". (p.3-125) A 145-foot tall drill rig mast cannot be considered consistent with the surrounding area or character type when the surrounding area or character is undisturbed forest canopy approximately 40 feet tall.

AG.303

The Draft EIS/EIR concludes erroneously that "While the duration of views of this lighting would be short, lighting would likely draw visual attention as it would create a strong visual contrast with night-time conditions in the immediate surrounding area". This statement is exemplary of the overall failure of the Draft EIS/EIR to identify: (1) project characteristics producing impact, (2) zones of impact, and (3) receptors within the zones. The Draft EIS/EIR needs to state the number, type and intensity of the lights to be used on the masts, and how many drill rigs would be in use simultaneously. The EIS/EIR preparer needs to do a field test or simulation of the actual night lighting to determine the zone of impact. How far from the project site is the "immediate surrounding area"? The lights from the drill rigs, well fields and power plant facility lighting would still be significant in an otherwise uninhabited area after implementation of Mitigation Measure 4.9.2c. The glow from these lights could be seen for miles, and would be reflected into the sky on cloudy nights (and on some dark cloudy days). To properly assess impact, the Draft EIS/EIR needs to identify the receptors in the zones who would get either direct glare or an enhanced sky glow from the project lighting.

Mitigation Measure 4.9.2c. regarding drill mast lighting states that

> "Drill mast right lighting shall also be shrouded and directed down the drill mast, not out from it. (This mitigation does not apply to any lighting of masts to meet Federal Aviation Administration requirements)."

AG.304

The parenthetical in this mitigation measure casts doubt on whether the mitigation will be feasible, because it implies that, due to the height of the drill rigs, the FAA will require the masts to be up-lighted so that they may be visible to aircraft. If that is the case, then the mitigation measure, as stated, could not be implemented and is of little or no value.

The Proposed Mitigation for Visual Impact would Largely be Ineffective, And Could Be Counterproductive. The Draft EIS/EIR states as mitigation for visual impacts to the Medicine Lake area (Measures 4.9.5a, p. 4-161) that the towers could be lower if they were spaced more closely together. Since a major part of the visual impact is the number and the mass of towers in view from any given viewpoint, rather than the height of towers, this measure could be counterproductive. AG.305

Helicopter Construction would Provide Substantial Mitigation. The Draft EIS/EIR failed to mention a major mitigation measure that would be effective in mitigating visual, as well as vegetation and wildlife impacts. The Draft EIS/EIR discusses helicopter construction in the noise section (p. 4-263), but fails to make the connection between helicopter construction and the elimination of access roads. Helicopter construction in mountainous terrain or roadless areas is used specifically to eliminate the need to build access roads. Helicopter construction is used extensively by some utility companies such as Southern California Edison, who do substantial construction in mountainous areas (*Devers-Serrano EIS/EIR (see Footnote 1), Devers-Palo Verde EIR, 1986*). The use of helicopter construction could eliminate land disturbance on up to 90 acres (per Table 2.2-1) and reduce public trespass into areas not now served by any roads. The Draft EIS/EIR should have analyzed the potential short- and long-term advantages (e.g. visual, vegetation disturbance) and disadvantages (e.g. noise) of this potential mitigation measure. AG.306

4.11 Land Use and Recreation

The EIS/EIR discusses, in general terms, land use and recreation in the Medicine Lake recreation area and within the Modoc and Klamath National Forests. Yet these discussions are not directly relevant to the impact of the project on recreation and residential land uses. For example, the EIS/EIR states (p. 3-157) that "an estimated 40,000 recreationalists visit the Medicine Lake recreation area each year, and the use of this area has increased by 8 to 10% over the past three years... The majority of users visit the recreation area between Memorial Day (in late May) and Labor Day (in early September). During the months of July and August 1996, the campgrounds AG.307

were observed to operate an average 65% occupancy during the week..." and at capacity on weekends. Table 3.11-1 indicates that there are a total of 75 camp sites at Medicine Lake in 4 campgrounds. There is no indication of the average length of stay or how many people are occupying the campgrounds at full or 65% occupancy. Similarly, p. 3-158 under "Dispersed Recreation Areas," states: "Use levels on the Doublehead Ranger District of the Modoc National Forest are currently at just over 200,000 visits per year." This data gives no indication of where the 200,000 visitors are in relation to the areas impacted by any portion of the project.

The EIS/EIR needs to present information on how many hikers, fisherman, and snowmobilers are within the project's impact zones during project construction and operations. For example, how many recreationists, on the average, would be within 1 mile of the power plant site or well pads and could hear the sounds of well drilling or generators/compressors? How many permanent residents and recreational users are located in zones where they would view any one of the transmission line alternatives as part of their foreground or middleground view? This information in necessary to assess the project's impacts on recreation and land use.

4.14 Noise

I. Introduction

The Fourmile Hill Geothermal Development Project EIS/EIR identifies noise as a significant unavoidable adverse impact to forest users and visitors to Medicine Lake, tribal members engaged in traditional activities at cultural sites, and residents of Medicine Lake and Tionesta. However, the noise analysis is so completely inadequate that the area that would be affected by substantial increases in ambient noise cannot be determined, the impact itself cannot be characterized and the number of sensitive receptors adversely affected cannot be estimated. The information presented is largely anecdotal and unsupported by data, reference sources or graphics. Thus, the lack of sufficient information and analysis prevents meaningful assessment by the public of the potential noise impact or the development of effective and feasible mitigation. AG.308

The major flaws in the EIS/EIR analysis are outlined in the Summary of Comments section and specific flaws are discussed in the Detailed Noise Comments section below.

However, in order to fully comprehend the inadequacies of the EIS/EIR's noise analysis, it is first helpful to understand what an acceptable noise analysis would encompass. Accordingly, the Standard Noise Impact Assessment Methodology section below is provided to establish a framework for this discussion. AG.309

II. Standard Noise Impact Assessment Methodology

Noise impacts can range from perception, to annoyance to hearing nerve damage and other adverse health effects. The most common adverse effects of noise on humans are increased levels of annoyance and stress, and disturbance of sleep. It is therefore important for EIS/EIRs to accurately characterize noise impacts so that their significance and the corresponding need for mitigation can be determined. Predicting noise impacts must be based on those factors which can be accurately measured — existing ambient noise levels, distances from sources to receptors, height and width of barriers, atmospheric absorption of noise over distance, machine-generated noise levels, etc. It is the grounding of the assessment in field-derived quantifiable data that gives credence to any prediction of future noise impacts.

In addition to adequate data, it is also important to understand the significance criteria used to assess the noise impacts. In this case, the EIS/EIR states that the Geothermal Resources Operational Orders (GRO) apply (p. 4-256). The EIS/EIR also uses the Siskiyou and Modoc county noise standards to evaluate impact significance under CEQA (p. 4-258). Additionally, Appendix G of the CEQA Guidelines states that a project may have a significant effect on the environment if it will conflict with adopted environmental plans and goals of a community where it is located or increase substantially the ambient noise levels for adjoining areas.

Hence, to be considered adequate, a noise impact assessment of a proposed industrial project must include the following information, most of which is missing from the EIS/EIR:

A. **Setting.** The accurate description of the existing noise environment must be based on:

1. An accurate description of terms and concepts that will be used in the noise assessment and the appropriate applications of each.

2. Identification of likely sensitive receptors that would be impacted by project-generated noise. Sensitive receptors would include on-site workers, residential areas and noise sensitive land uses such as, in the case of this project, recreational land uses. Sensitive receptors should be mapped at a scale allowing a relatively accurate assessment of distance and, if relevant, intervening noise barriers.

3. An adequate sample of field-collected noise data which will represent the existing noise environment at the locations of representative sensitive receptors (collected for the assessment at hand or from other recent and relevant studies). The sampling locations must be described, including type of equipment used, interval period set, date

and time of sample, weather conditions, location of noise meter, and primary noise sources during the sampling period.

Typically, noise is recorded in decibel levels by integrated sound level meters (SLMs) which sample the noise environment 8 times per second. The SLM can be programmed to calculate a range of noise descriptors over fixed intervals, such as every 15-minutes, during the 24-hour period. For environmental assessments, the SLM is set to adjust the sampled noise levels to approximate the response of the human ear to frequencies. This adjustment is referred to as the A-weighting scale and noise levels are recorded as A-weighted decibel levels or dBA.

An important descriptor calculated by the SLM is Leq (equivalent noise level) which is a single decibel representation of the varying sound energy levels recorded by the sound meter over the full interval. Leq is used to describe ambient or background noise, the baseline noise level to which project-generated noise will be added in an assessment of noise impact. A review of the interval data from a 24-hour period identifies those periods of the day which are most noise-sensitive (typically those intervals with the lowest noise levels).

Recording noise over a 24-hour period also allows the most accurate representation of "community noise levels" such as Ldn and CNEL, which are the descriptors most often used in planning to determine noise compatibility levels with differing land use types. Ldn, which is based on interval-collected Leqs, assigns a 10 dB penalty to nighttime noise (10 pm to 7 am) to account for a community's added sensitivity to noise during normal sleep periods. Ldn was used as a criteria of significant impact in the Fourmile Geothermal Development Project EIS/EIR.

4. Noise levels and descriptions of expected noise-generating industrial activities associated with the construction and operational phases of the project. These activities, which are actually assemblages of operational equipment, should be individually described as to component elements, location in relation to other assemblages and sensitive receptors, expected frequency of operation, and identification of sources used for noise level data.

Unless recent and relevant noise data are available for similar assemblages of equipment sampled at other facilities, each area of activity should be calculated as a noise generating source based on the noise levels of the component elements. Noise levels of components can be obtained from the manufacturer or measured in the field.

5. Relevant regulatory setting. Identification of existing plans, policies and regulations which apply to the area and land use of proposed project and the sensitive receptors. Most commonly these are Noise Elements of local general plans, or related Noise Ordinances. In the case of the Fourmile Hill project, the Geothermal Resources Operational Orders (GRO) of the U.S. Geological Survey, the Siskiyou and Modoc County noise elements, and CEQA apply.

B. The **Impact Assessment** will determine whether a potentially significant impact could occur as a result of project approval. Impact assessment must include the following components:

1. Identification of Significance Criteria to be used to assess the threshold of impact above which project noise would be considered an adverse effect of the project. CEQA identifies a substantial increase in project noise as an significant impact. However, if the increase in noise would still result in noise levels near the lower threshold of perception, then ordinary significance criteria (e.g. a 5-decibel increase) may not be appropriate. Plans, policies and regulations governing an activity or jurisdiction may also apply. The criteria should distinguish between short-term construction-related impacts and long-term noise generation.

   In the case of the proposed project, the relevant criteria of significance are the GRO criterion of 65 dBA Leq at 0.5 miles from the source, and the Siskiyou County standard for open space areas of 50 dBA Ldn. The local standard is an appropriate measure of significant impact under CEQA.

2. Identification of the area potentially impacted by project noise. The impact area is defined based on calculations of a worst-case scenario of combined project noise sources. Calculations should include composite noise attenuated for distance, vegetative cover and physical barriers (if relevant) and atmospheric absorption. The longevity of the noise impacts should be considered. For example, construction that lasts for only a week may have less of an impact on receptors than other noise. In the case of multiple sensitive receptors, the impact area or potential noise level should be mapped. This is the area which would exceed the noise level set in the significance criteria.

3. Identification of sensitive land uses within the impact area and description of the potential impact and its effect on each sensitive land use.

4. If an adverse impact is identified, any further mitigation measures which could effectively and feasibly further reduce noise levels should be listed.

III. Summary of Noise Comments

The detailed comments below are lengthy and address the EIS/EIR's noise analysis, paragraph by paragraph. A summary of the main points addressed by the detailed comments is therefore appropriate.

- Assumptions supporting the selection of sensitive receptors are not explained. The analysis should focus on those sensitive receptors which are within areas potentially impacted by project noise. The impact area of the power plant and well field and the transmission line should be delineated on graphics at a reasonable scale such as 1 inch = 2000 feet. Recent aerial photos should be consulted to identify the locations of sensitive land uses. All potential sensitive receptors and sensitive land uses (such as areas with traditional recreational use) that are within the potential impact areas should be shown on the maps so the relation to the impact area can be understood. Receptors which are miles from the power plant and well fields do not need to be assessed or depicted. AG.310

- Assumptions are not explained and sources are not given for any of the noise generation levels assigned to construction and operation activities and used as the basis of the noise analysis. Noise generation by stationary sources is typically characterized by a steady state noise level (Leq) in dBA sampled at a distance of 50 or 100 feet. If these measurements cannot be obtained from similar equipment or previous noise analyses, the manufacturer of the equipment can supply noise levels measured according to industry standards. AG.311

- The EIS/EIR never identifies the noise levels of the stationary sources it identifies as the primary noise generators: well drilling, the operational well field, and the operational power plant. The noise levels presented in EIS/EIR tables are not identified as single or combined noise levels and a source for the noise levels used in the analysis is not cited. Noise levels presented in the tables are given only as noise attenuated by the unspecified distance between the source and the receptor. AG.312

- Ambient noise levels were sampled by an unusual methodology over unspecified time periods. Ambient noise should be sampled by standard techniques currently used in noise impact assessment. Noise levels should be measured using integrating sound level meters acquiring data at a rate of 8 samples per second and calculating the samples into continuous equal intervals (such as every 1 minute or every 15 minutes) over a 24-hour period. This common methodology identifies peaks and lulls during a 24-hour period AG.313

and is also used as the basis for computing community noise level descriptors for planning (such as Ldn and CNEL). Sampling noise for 20 seconds of each 5 minutes, as in the EIS/EIR analysis, requires long measuring periods before L10 or Leq can be determined with reasonable accuracy. This type of coarse monitoring can miss significant loud events, which are particularly important when measuring Leq (a descriptor which is greatly affected by higher readings). Noise should be sampled at receptor locations either concurrently or under very similar conditions for comparison to be valuable. Information as to the duration and dates of the monitoring period at each location should be given.

- The EIS/EIR assigns ambient noise levels sampled at one location to other locations without justification. Noise levels for the Tionesta vicinity are estimated to be within a 20 dB range typical of rural areas while other rural receptor areas were field sampled. There is no explanation given as to why certain locations were sampled and other locations were assigned an assumed ambient noise level. All locations of potential sensitive receptors should have been sampled for noise levels. AG.314

- There is no attempt to describe present use patterns (other than snowmobile use) in the portion of the USFS lands which potentially could be impacted by noise. Vague terms such as hunter or hiker are used to describe potentially affected user groups and it is not possible to determine if 10 or 1000 visitors would be affected by project noise and where the established uses are in relation to the project. Traditional recreational uses within the impact area need to be mapped. An estimate of the levels of each usage for the impact area needs to be obtained from USFS sources. AG.315

- The impact area is never identified though the use of simple noise attenuation methods. The basis of analysis could easily have been transferred to maps of potentially affected areas and receptors. The impact area in vicinity of the power plant, well fields, and transmission line needs to be mapped. AG.316

- Project-generated noise is not shown in combination with ambient noise levels. Attenuated noise levels are depicted in the impact tables as occurring in a vacuum. AG.317

- The EIS/EIR impact assessment relies on inappropriate significance criteria. The principal area of noise impact for the proposed project is in Siskiyou County. All of the noise producing components of the project -- the power plant and well-drilling areas are entirely in Siskiyou County, although short-term noise from the transmission line construction may affect residential areas of Modoc County to the east. General Plan noise compatibility levels and noise policies could be applied to any sensitive receptor in Modoc County, but AG.318

should not be used as significance criteria to assess noise impacts to recreational, open space and residential land use areas in Siskiyou County.

The impact area in Siskiyou County is primarily recreational open space. Open space areas of Siskiyou County have a median noise level of 53 dBA according to the General Plan Noise Element (page 50). Table 13 of the Siskiyou County Noise Element (page 54) identifies an Ldn of 50 dBA as acceptable for open space land use such as in the project vicinity. The acceptable noise level for residential areas of the County is an Ldn of 60 dBA.

- The basis for the determination of significant impact is never clearly established. CEQA defines a significant noise impact as a substantial increase in ambient noise. The EIS/EIR needs to identify what criteria will represent a significant increase. The EIS/EIR translates the Ldn compatibility standards from General Plans into Leq noise levels, for example the Ldn of 60 dBA becomes an Leq significance criteria of 54 dBA. There is no explanation of why the given Ldn levels for open space are not used as significance criteria and how or why Leq levels were derived. Ldn assigns a penalty to nighttime noise. Leq describes time-vary noise with no penalty assigned. The standards are not interchangeable as each accounts for a different impact. Leqs can describe the range of noise levels produced by a project while Ldn describes the overall environment of a community. AG.319

  Typically 5 dB is considered a perceptible increase in ambient noise. However in this study, the ambient noise levels for sensitive receptors presented are so low that a 5 dB increase could be below any threshold of community response. For this study, the threshold of increase should be selected, based on actual measurements in the field, to show the increase that would actually produce a perceptible increase in noise and/or a community response.

- The analysis of noise impacts to sites important to tribal members is so vague it appears completely dismissive. Existing or project-generated noise levels or significance criteria are not identified. The noise impact is considered significant and unavoidable simply because the impact analysis was not completed. The EIS/EIR states: "The effect [of noise on traditional cultural values] is considered potentially significant due to the uncertainty as to whether the noise would be audible at the sites, would conflict with use of sites, or occur at the same time tribal members use the sites (page 4-69, paragraph 3)." These are exactly the issues the EIS/EIR should have addressed. AG.320

IV. Detailed Noise Comments

A. Impacts to Native Americans

1. Failure to Identify Impacts on Native American Traditional Sites and Uses

Page 4-68. The EIS/EIR does not demonstrate a degree of agreement between its analysis and the Native American tribal groups affected. It is understandable why no mapping of traditional sites is provided given the sensitivity of the uses of these areas, but the analysis appears to have been developed in a vacuum without feedback from tribal members. No discussion of the potentially affected noise environment is presented and it is not even clearly established what impacts would occur. AG.321

Sensitive information regarding site location does not need to appear in the EIS/EIR. However, significance criteria, description of the impact, and feasible and effective mitigation measures should be included.[2] A mapped impact area with potential noise contours from a worst-case noise generation scenario should be developed for tribal inspection and presented along with a construction and operations schedule. Significance criteria should be developed in conjunction with tribal members. Any affected sites and uses within the impact area could then be identified by tribal members, and the development of meaningful mitigation to reduce the impact could begin.

Pages 4-79 through 4-81. The alternative transmission line alignments are assessed on these pages. Despite the alternative locations of the transmission line segments, there is no identification of sensitive receptors to noise nor any assessment of the relative noise impacts to receptors if an alternative route is selected. This information is not provided in Chapter 2, Alternatives either. AG.322

2. Insufficient Information Regarding Construction-Related Noise Impacts on Native American Traditional Uses and Sites

AG.323

Page 4-68. The EIS/EIR author states that "Well-drilling and testing activities would also generate noise in the construction phase of the project and would result in the highest noise levels of construction. Construction noise sources and sound levels are

[2] The impact analysis to traditional uses is nearly impossible to follow. Section 4.6.3. (Effects of Project Noise on Traditional Sites and Uses) should either be combined with the Section 4.14 (Noise) or be presented as a stand alone assessment. In the DEIR, there are continual references to "see Section 4.14, Noise" without any specific reference to which page or paragraph of the 17 pages of Section 4.14.

discussed in Section 4.14, Noise, of this document." However, well testing is never discussed in the noise section nor are the noise levels of well drilling or well operation stated in Section 4.14. Only attenuated noise levels (i.e., the noise levels after they are reduced by an intervening distance or barrier) are given. The distance used to arrive at the attenuated noise level is also not given. The sources of the noise levels used for the various pieces of equipment or assemblages of equipment are never given (i.e., whether they are derived from another document, measured in the field or obtained from the manufacturer).

Page 4-68, paragraph 3. On page 4-69, paragraph 3, the EIS/EIR states "Construction and drilling noise levels would be highest at the traditional sites closest to the proposed wellfield and power plant. These include Sites #7, #8, #10, #12, and #13." The EIS/EIR, however, does not provide information regarding the distance of these sites from the noise sources or if noise levels would be reduced by distance, intervening barriers, vegetation and atmospheric absorption. The EIS/EIR needs to estimate the potential impact at the distances of the sensitive receptors or no conclusions can be made regarding the significance of these impacts. AG.324

Page 4-69, paragraph 4. The EIS/EIR concludes that decommissioning noise impacts would be considered a short-term significant adverse effect if the noise altered the character of the site during tribal use or caused tribal members not to conduct traditional practices in the area. This statement is obvious and should have been the starting point for impact assessment. As throughout the document, the discussion of decommissioning is speculative and dismissive and does not rely on data. AG.325

3. Insufficient Information Regarding Operations-Related Noise Impacts on Native American Traditional Sites and Uses

Page 4-69, paragraph 1. The EIS/EIR author refers to primary sources of noise impacts as noise generated by the cooling tower fans and the sound of water falling through the baffles of the cooling tower. These noise sources and others used are not evaluated or described in the noise impact section 4.14. AG.326

Page 4-69, paragraph 3. This paragraph discusses potential significant effects of operational noise on tribal sites but with no reference to any supporting analysis from elsewhere in the EIS/EIR. The analysis should reference which tribal sites would be affected by what levels of noise emanating from each type of facilities at the power plant and well field areas. The analysis should state the intensity, frequency, and duration of the noise intrusion that could be expected at each affected tribal site. AG.327

4. **Failure to Develop Measures that Adequately Mitigate the Project's Noise Impacts on Native American Traditional Uses and Sites**

Page 4-68, paragraph 6. The EIS/EIR concludes that construction-related noise would be a short-term, significant impact if it interfered with religious or ceremonial practices. The EIS/EIR states that "the impact could not be avoided and could not be fully mitigated." This conclusion has apparently been reached without any attempt to work with tribal members to develop mitigation that would give them the right to schedule uses at traditional sites if necessary during the construction period. AG.328

Page 4-69 re: Mitigation 4.6.3a. The mitigation measure describes a means for tribal members to communicate with Calpine regarding scheduling during the construction period. However, the measure does not describe any meaningful or enforceable means for tribal members to influence the Calpine construction schedule. Tribal members may simply "contact" a Calpine representative. There is no arbitration party nor any compulsion on the part of Calpine to cooperate.

The mitigation measure also states that Calpine and the USFS shall consult with appropriate local tribes to determine which sites should be evaluated for noise effects. The measure calls for a monitoring program which would determine the actual project-related noise levels. AG.329

> "A monitoring program shall be defined that would determine actual project-related noise levels (with monitoring during drilling and power plant operation)."

The measure, as worded, is actually a deferred impact analysis which should have been completed for this EIS/EIR analysis.

The measure also carefully states that "Rescheduling certain project activities to minimize effects also may be considered." This wording is so vague that it eliminates operational noise impacts from further mitigation if impacts to traditional activities occur when the project is fully operational.

Page 4-69 re: Mitigation 4.6.3b. A poorly defined monitoring program is identified in Mitigation Measure 4.6.3b which "would determine actual project-related noise levels" but provides no means of mitigating the impact if one is determined to exist. This clearly appears to be an attempt to defer analysis of impacts to traditional cultures until after public review is completed. AG.330

Page 4-258, paragraph 5. The EIS/EIR states: "Construction is expected to be limited to daytime hours." However, the limitations placed on the project to help AG.331

reduce the noise impact are listed in Mitigation Measure 4.14.2b which states that construction could occur daily, except Sundays and legal holidays, from 7:00 am until 10:00 pm. Thus, construction would <u>not</u> be limited to daytime hours.

Page 4-267, Mitigation Measures. The mitigation measures presented here state that Calpine shall use feasible noise controls, limit construction times to Monday through Saturday from 7:00 am to 10:00 pm and respond to noise complaints during the construction period. The Forest Service is assigned the responsibility of monitoring the feasible noise controls but no performance standards are given that would be considered exceedances nor are any protocol for registering a complaint established. There is also no indication that the Forest Service will take on this monitoring responsibility. To be a feasible mitigation measure the measure must contain reasonable performance standards and be enforceable. AG.332

B. **Impacts to the Medicine Lake Area**

1. **Insufficient Information about Potential Sensitive Receptors in the Medicine Lake Area** AG.333

Page 3-192, paragraph 1. The EIS/EIR author identifies the sensitive receptors for project noise as the recreational areas and seasonal residences at Medicine Lake; the community of Tionesta and sites important to local tribal members. The EIS/EIR refers to Figure 3.14.-1 and Figure 3.6-1 for location of the sensitive receptors. Figure 3.14-1 indicates only one residence and that is mapped at the southwestern edge. In contrast, in Section 3.11 (Land Use and Recreation), residences are described as being clustered at the south and southeastern edges of Medicine Lake. The area to the southeast is labeled "cabins." Also, the scale of Figure 3.14-1 is too coarse to begin to determine the distance from residences to the project. It is never clearly stated or mapped where residences are in relation to the potential impact area for project noise. AG.334

It is possible that proper noise analysis could show that other sensitive receptors exist that were not identified in the EIS/EIR. For example, if any residences or campgrounds in the Medicine Lake area are found to be within the area impacted by project noise, recent aerial photographs should be used to show the location of these homes in relation to project components. Relevant sensitive receptors close to the principal project site such as trails and roads should also be identified on aerial photos to demonstrate their relation to the project noise sources. AG.335

Page 3-193, Figure 3.14.1 does not include the community of Tionesta and does not indicate the location of residences in the Medicine Lake area in a meaningful way. The figure also does not identify receptors 4 and 5 in the legend and does not indicate recreational uses in the vicinity of the power plant and wellfield. AG.336

2. Insufficient Information Regarding the Methodology Used to Evaluate Noise Impacts in the Medicine Lake Area

Page 3-194, paragraph 2. The methodology paragraph needs to contain information listed below in order for the public to determine that the noise environment was adequately characterized. The methodology section should provide the following information:

- Who actually collected the noise data and performed the analysis? The tables in the section are credited to a subconsultant, but it is not clear whether the consultant or the subconsultant collected the data.
- On what dates and at what times were noise measurements taken at the 3 locations around Medicine lake? Was noise monitored for 1 hour or 24 hours at each location?
- How is "low to moderate recreational use" determined and what does it represent? How close was the nearest occupied campsite to Site 1 during monitoring? Was Site 1 physically closed off during monitoring?
- What were the primary influences at each location during monitoring?
- Why was the unusual noise monitoring methodology selected and what are the advantages of this methodology over the standard 24-hour continuous sampling normally performed? Monitoring 20 seconds each 5 minutes is monitoring only 7% of all noise in a 24-hour period. In the standard method, integrated sound level meters sample sound continuously, several times a second, and this method produces more accurate descriptors for ambient noise. It is likely that the EIS/EIR's sampling method missed many of the loudest noises in the interval (e.g. car door slamming, person shouting, etc.) that would have affected the calculated Leq.
- How were sensitive receptor locations selected? What assumptions were used to assign ambient noise levels recorded at one location to other locations? What assumptions were used to assign noise levels to sensitive receptor locations that were not field-monitored for noise?

AG.337

Page 3-194, paragraph 4. This paragraph describes the field monitoring results of ambient noise at sensitive receptor locations. There are 5 identified receptor locations, but only three locations were field-monitored for an undefined period of time. No explanation is given to justify why noise levels sampled at site #3 are also assigned to site 4 and 5. Why weren't the 3 closest locations to the primary noise sources (receptors #1,#3 and #4) monitored for ambient noise instead of #1, #2 and #3?

AG.338

Page 3-194, paragraph 5. The EIS/EIR author states that L90 and L99 are good indicators of background noise levels because they are less affected by relatively high noise events. L90 and L99 indicate the lowest 10% and 1% of noise levels, respectively, recorded during a sampling period. This is the ambient noise level without any of the louder, intrusive noise which have the greatest proportional influence on Leq. Given the coarse sampling method employed for EIS/EIR assessment, the L01 and L10 (highest 1% and highest 10% of noise sampled) and the L90 and L99 levels shown in Table 3.14-2 are not accurate. It is highly likely that sampling only 7% of noise over an undefined time period would not yield a large enough data set to determine the range of extremes of noise experienced during the sampling period. In the case of the areas sampled for the EIS/EIR, Table 3.14-2 shows essentially no noise events louder than quieter speech under the column L01 (42.9 dBA to 44.7 dBA). Even birds chirping close to a noise meter would produce noise exceeding these levels.

AG.339

Page 3-195, Table 3-14.2. Leq is decibel measurement of an equivalent noise levels of time-varying noise over a given time period. Leq does not imply an hourly measurement nor a 24-hour period measurement. The definition of Leq given in Footnote #2 is incorrectly and confusingly defined as:

> "the average hourly equivalent sound level over a 24-hour period with a +10 dB weighting applied to the nighttime, which is what Ldn is based on. Leq, or equivalent sound level, is the loudness of a constant sound having the same sound energy as the actual sound which varies in loudness over a given time period."

AG.340

If the Leq values listed in Table 3.14-2 have had a 10 dB penalty assigned, this should be clearly stated in the column heading as Leq + 10 dB.

Also, the Table cannot be clearly interpreted. The time period monitored for each location should be presented as a footnote. The EIS/EIR does not contain a justification as to why noise levels for location 3 are assigned to locations 4 and 5. This should be discussed.

Page 3-195, paragraph 1. The paragraph states that during noise monitoring, campsites at Medicine Lake were at a 10 to 15 % occupancy. It does not state what number corresponds to this occupancy percentage. The EIS/EIR also does not discuss how it determined that noise levels would be approximately 8 dB higher during peak use periods. Noise data should be collected during both peak and low visitation periods.

AG.341

Page 3-195, paragraph 3. The EIS/EIR describes the composition of octave band frequencies and states: "For reference, the predominant frequency of middle C on the piano is about 250 Hz but the piano produces a tone at 250 Hz, not an octave band of sounds." This explanation of tones produced by a piano does not seem to make

AG.342

any sense. The EIS/EIR does not discuss how this is relevant to an explanation of the effect of the octave band on noise actually heard by a receptor.

Page 3-196, Table 3.14-3: Ambient Octave Band Sound Levels at Three Representative Receptor Locations. There is no interpretation of the data presented in this table. The EIS/EIR does not explain why this data was presented or its relevance to the analysis at hand. AG.343

3. Insufficient Information about Construction-related Noise Impacts in the Medicine Lake Area

Page 4-263, Table 4.14-1. Table 4-14.1 purports to show sound levels from construction at selected receptor locations. The data presented in this table cannot be evaluated as reliable due to the following deficiencies in the analysis: 1) no noise level is ever given for well drilling equipment, 2) no noise level is ever given for combined activities during power plant construction, 3) no distances to receptors 1,2 and 3 from the well field and power plant are given, 4) no distances are given from receptors 3, 4 and 5 to proposed transmission lines, 5) no distinction is made between the impacts at locations 3, 4 and 5 even though the receptors would be at varying distances from the transmission line, 6) no documentation or assumptions to support the 86 dBA assigned to power line installation is presented, and 7) the ambient noise levels used for receptor locations are inaccurate. AG.344

Page 4-263, paragraph 2. The EIS/EIR author states that an assessment of impact of helicopter noise generated during transmission line construction would be speculative because the EIS/EIR author has no data. Estimates of noise impacts can be made by either sampling helicopter noise or consulting published sources. A project engineer could estimate the hourly number of trips required and likely trajectory during construction. In addition, a "worst case" analysis could be made by having a real helicopter fly directly over the Medicine Lake Campground and taking field measurements. The assessment of helicopter noise then would not be speculative. Instead, it would be based on meaningful data. AG.345

Page 4-263, paragraph 3. After stating that an assessment of helicopter noise is "at best, speculative" the EIS/EIR then takes the liberty of concluding on the basis of no data whatsoever, that "helicopter noise would be most apparent and loudest at receptor locations nearest to ongoing construction," and that "helicopter noise would be loudest at the Northern Campgrounds (Site 1)." Such a conclusion, should be based on field measurements, as discussed for the previous paragraph, and not on speculation. AG.346

Page 4-264, paragraph 1. This paragraph states that the wellfield and power plant construction noise would not exceed the GRO Order No. 4 limit of 65 dBA at 0.5 miles. However, other criteria such as county noise standards and CEQA criteria are not discussed. The noise should be evaluated under these standards too. Also, the AG.347

stated noise level of "86 dBA at 50" appears here for the first time in the document without any references or documentation that explain how this figure was obtained.

4. Insufficient Information Regarding Operations-Related Impacts on the Medicine Lake Area

Page 4-266, paragraph 2. Impacts from operational noise are presented as attenuated noise occurring in a vacuum. Operation-related noise levels are not combined with existing ambient noise or other simultaneous noise-generating activities. The EIS/EIR does not provide distances used to calculate noise attenuation. If all 5 sensitive receptors are outside the impact area of noise, then this should be demonstrated by a map of the impact area and a concise assessment of the impact. Presenting frequency calculations and decibel levels for seemingly undetectable noise (as shown in Table 4.14-4) does not contribute to the impact analysis. AG.348

Page 4-267, paragraph 1. The EIS/EIR author states: "Although potentially detectable at times, operational noise would not be considered a significant impact." However, the text does not explain which frequencies would be audible above ambient noise or how the overall noise level (last column) is derived in Figure 4.14-4. AG.349

C. Impacts to the Tionesta Area

1. Insufficient Information about Potential Sensitive Receptors in the Tionesta Area

Page 2-48. The EIS/EIR suggests that blasting may occur when installing the transmission line support structures. (EIS/EIR, p. 2-48.) The noise impacts from blasting should be identified. For example, the EIS/EIR should state whether sensitive receptors such as Tionesta residences or recreators would be affected. These receptors should be mapped in relation to the blasting. If blasting would affect sensitive receptors, then the EIS/EIR should discuss its blasting plan, the type of blasting, potential blasting noise levels, and notification measures prior to blasting. The EIS/EIR should also discuss mitigation measures such as pre-blast and post-blast surveys of homes, and control of blast vibration and airblast. AG.350

Page 3-192, paragraph 1. The EIS/EIR identifies Tionesta as a sensitive receptor and refers to Figure 3.14-1 and Figure 3.6-1 for location of the sensitive receptors. Figure 3.14-1 does not show the location of Tionesta, which is found only with some difficulty in Figure 2.2-2. However, Figure 2.2-2 gives no idea of where the receptor locations in Tionesta are in relation to roads or the proposed project. AG.351

Page 3-196, paragraph 1. This paragraph purports to describe the noise environment at the community of Tionesta. Tionesta is approximately 16 miles east of locations 1 and 2 sampled for noise for this EIS/EIR. Tionesta is 3 miles west of State Highway 139 and just south of Lava Beds National Monument Road according to the CSAA map "Northeastern California." The EIS/EIR (page 3-165) states that the transmission line would pass approximately 1500 feet from some point in this community. Without information about the location of the transmission in relation to the homes, it is impossible to determine whether the transmission line will have a significant noise impact on Tionesta residences. AG.352

2. Insufficient Information Regarding Impacts on Tionesta

Page 4-268, paragraph 3. The EIS/EIR states that the impacts associated with initial construction of the transmission line and decommissioning would be considered a significant impact as project noise levels would exceed Modoc County noise standards during construction. However, this assessment of significance is inadequate because no substantiated data for the Tionesta area has been presented. There is no source information on the decibel levels used for construction equipment, no decibel level estimated for helicopter use, no ambient noise level for the Tionesta community, no map showing sensitive receptors in relation to the proposed transmission route, and no indication of the number of receptors that would be affected. AG.353

Page 4-269, paragraph 3. Mitigation measures previously discussed are also applied to construction impacts in the Tionesta area. See also comments for page 4-267, Mitigation Measures. AG.354

D. Impacts to Forest Users

1. Insufficient Information About Construction-Related Noise Impacts on Forest Users

Page 4-260, paragraph 3. The EIS/EIR concludes that:

> "The project impact on noise levels from project construction, operation, and decommissioning could result in short-term significant impacts to forest users that come in close proximity to the wellfield and power plant site or to the transmission line."

AG.355

Conclusions regarding impact significance should be confined to adverse and unavoidable or less than significant. Short term impacts typically refer to impacts occurring over a short duration. The EIS/EIR author repeatedly uses the concept of short-term in reference to the sensitive receptor leaving an area in a short time because of annoying project impacts (see page 4-260 paragraph 6, page 4-261

paragraph 4, page 4-192, paragraph 1, and page 4-198, paragraph 3). The idea that individuals must leave an area due to project effects identifies a significant impact. If individuals actually leave the project area strictly because of noise, this should also be considered a significant impact.

Page 4-260, paragraph 4. The EIS/EIR refers to construction noise levels of 86 dBA. The criteria used to determine this noise level have not been explained. AG.356

Page 4-260, paragraph 5. The EIS/EIR identifies motorists and hunters as potential sensitive receptors to construction noise. However, no information as to recreational use in the area, which may be affected by construction noise, is presented and the effect of the impact cannot be understood. For example, do bicyclists use the forest road or trail network? Are there fishing streams in the project vicinity? The EIS/EIR author estimates a hiker or hunter could pass within 200 to 400 feet of the site, but does not identify any trails that are close to the project site. These items need to be quantified in the EIS/EIR. The EIS/EIR should present a large-scale maps with contours showing the extent of the area impacted by initial and in-fill construction noise. The contour maps should identify impact areas and any residences or recreational trails along the transmission line route. AG.357

The EIS/EIR states that drilling noise is "like a low frequency hum or 'rushing' sound" but it never establishes a decibel level for drilling noise. The statement that "sounds are not expected to be particularly annoying to people" is completely unsupported. Additionally, the idea that people would be in the area only a short time reflects the impact that noise could have in driving them away. This is a significant impact. AG.358

Page 4-260, paragraph 5. This paragraph describes noise impacts to visitors to the National Forest. Noise levels on Route 49 are estimated at 62 dBA. Closer to the project site, noise levels are estimated between 68 dBA and 74 dBA. The EIS/EIR states: "These sounds are not expected to be particularly annoying to people." The EIS/EIR does not refer any significance criteria that define "annoyance to people." The conclusion also does not reflect impact significance as defined by CEQA and it does not conform with the land uses described for the sensitive receptor locations. See comments for Page 4-256, paragraphs 3 through 5, page 4-257, paragraph 5 and page 4-258, paragraph 3. AG.359

Page 4-261, paragraph 1. The EIS/EIR states that noise levels at varying distances from the operational project were estimated using standard attenuation. The noise analysis should map contours that show unattenuated and attenuated noise levels in relation to noise sources. This would identify the area affected by the project's operations in relation to any sensitive receptors. AG.360

2. Insufficient Information About Operations-related Impacts on Forest Users

Page 4-261, paragraph 2. The EIS/EIR identifies visitors driving by on Route 49 as sensitive receptors who would probably hear project noise at an estimated 62 dBA (construction noise) or 66 dBA (operational noise). Actually, people in vehicles would hear only the louder noises their own vehicles would generate. The noise from the vehicles would be in the 60 to 70 dBA range (with windows open), which would tend to mask most project noise. Visitors that stop their cars, picnic, hike or bicycle on or near route 49 would hear project noise, but these sensitive receptors are not discussed. AG.361

The EIS/EIR uses an attenuated Leq of 66 dBA at 850 feet for the operational project without establishing the source or noise levels of the project components. Given the attenuated 66 dBA, one can calculate that some project components would have to be generating 90.6 dBA at 50 feet. Is this the operational noise level the EIS/EIR author is using? If so, what is the source? Page 4-257, paragraph 1, states that expected noise levels are based on noise measured at similar facilities, but the EIS/EIR does not indicate that such sources were ever consulted. AG.362

3. Inadequate Analysis of Power Plant and Well field Impacts on Forest Users

Page 4-262, paragraph 2. The EIS/EIR concludes that the wellfield and power plant will have a "[s]ignificant unavoidable impact <u>if</u> visitors are exposed to noise levels above County noise compatibility standards." At this point in the analysis — the conclusion — the EIS/EIR should have been able to determine, not *if*, but *whether*, visitors will or will not be impacted by the project. Such a statement proves that no actual analysis of noise impact has been conducted. AG.363

The statement that there would be a "significant unavoidable impact <u>if</u> visitors are exposed to noise levels above county noise compatibility standards," is inconsistent with the impact assessment on page 4-193, paragraph 5 (Land Use and Recreation). There the EIS/EIR states: "When considered together, project operation-related odor, <u>noise</u>, and the visibility of facilities would have an adverse, but not significant impact on the overall recreation experience." Thus, it is unclear what impact the project would have on forest users, although it is reasonable to believe that noise will drive them away from parts of the forest.

4. Failure to Adequately Mitigate Noise Impacts on Forest Users

The EIS/EIR states that "Mitigation Measure 4.14.2a through 4.14.2c, designed to reduce noise effects on sensitive receptors in the Medicine Lake and Tionesta area, AG.364

would also reduce the forest noise levels in close proximity to the proposed well field and power plant site and along the transmission line." (P. 4-262.) This is very misleading as the aforementioned mitigation measures only apply to the construction and decommissioning periods of the project and not as to operations-related noise.

E. Failure to Adequately Assess Impacts Associated with Well Drilling

Page 4-258, paragraph 6. The EIS/EIR describes well-drilling activities but does not present noise levels for well drilling in its discussion on initial construction or infill. Well drilling would occur over a 36-month period and throughout the life of the project. Well drilling continues day and night for 25 to 90 days at a time, with noise generated at an elevation 40 feet above ground level. Noise levels are not assigned to well venting nor the possible reductions that would be achieved with the installation of a separator/muffler. Thus, impacts of these activities cannot be assessed. AG.365

The EIS/EIR should clearly map the area of potential noise impact both during construction and operation and identify sensitive receptors within the impact area.

Page 4-259, paragraph 2. The EIR/EIR does not explain how it obtained the noise level of 86 dBA assigned to construction equipment. The assemblage of equipment producing the 86 dBA level is not even described. AG.366

Page 4-259, paragraph 5. The EIS/EIR author states that in-fill well-drilling would be similar to construction period well-drilling. However, no noise levels were presented for construction well-drilling. The EIS/EIR should clearly identify the range of sensitive receptors and the impact area for noise associated with in-fill well-drilling and power plant operation. AG.367

Page 4-264, paragraph 2. The EIS/EIR presents an attenuated figure for well-drilling as if this activity could occur in a vacuum and without associated construction noise. Noise levels of project components should be presented at the standard 50 or 100 feet distance, should be annotated, and then calculated in combination with existing background noise and other activities which could occur simultaneously. AG.368

Page 4-264, paragraphs 3 and 4. The paragraph discusses the data shown in Table 4.14-2: Estimated Sound Levels from Well Drilling at Selected Receptor Locations, which presents octave band frequencies estimated for project impacts at receptor locations. However, until this point, the EIS/EIR had not included an analysis of the attenuating effects of barriers in reducing project noise. The EIS/EIR states that "an evaluation of octave band noise was conducted to determine whether such noise could be audible and potentially annoying." Paragraph 4 states "Noise barrier effects associated with terrain reduced the sound levels at all receptor locations but the reductions were least for these two wells." No further information on the analysis technique is presented. If the analysis is to include the effect of barriers in reducing noise, then this should have been done across the board and not introduced randomly in the middle of the analysis. AG.369

Page 4-265, Table 4.14-2: Estimated Sound Levels from Well Drilling at Selected Receptor Locations is presented without sources. The octave band frequencies of well-drilling equipment are attenuated to the location of sensitive receptors calculated over unstated distances. No octave band information is provided for the project impact area. No information is given as to how the octave band data was collected or whether the data represents project noise in combination with ambient noise. AG.370

Page 4-256, Table 4.14-3: Estimated Sound Levels from Well Drilling and Power Plant Operations at Selected Receptor Locations. All comments for Page 4-263, Table 4.14-1 also apply to this table. One of the more critical errors of Table 4.14-3 is the separation of existing noise levels and operational noise levels from the column labeled Total Level. The column labeled "Total Level" is incorrect because ambient noise is not factored into the total noise. The table also fails to identify the distances used for attenuation or the noise levels at 50 feet or 100 feet from the noise source. AG.371

Page 4-266, paragraph 1. The first sentence states that "the primary source of noise from the proposed action would be the power plant," but the noise level of the power plant is not given in the EIS/EIR. The paragraph goes on to discuss that every two years infill wells would be drilled at the proposed well pads and that infill well drilling would last from 25 to 90 days. In discussing impacts to Medicine Lake area, the EIS/EIR states: "Once the wells are drilled, they generally produce relatively little noise." However, no discussion of operational geothermal well noise is ever presented in the EIS/EIR. Also, the EIS/EIR does not provide quantifiable information on noise reduction from insulation, even though information could be obtained from similar operations. AG.372

F. Failure to Adequately Analyze Impacts Associated with Decommissioning

Page 4-260, paragraph 1. The description of noise generated during decommissioning is dismissive and insufficient. The EIS/EIR states:

> "As decommissioning activities would use similar equipment to that described above for construction at the wellfield and power plant site and along the transmission line, noise levels would be similar to those identified above for these sites." AG.373

The components involved in plant decommissioning should already been ascertained. Thus, noise generation can be estimated and characterized in the EIS/EIR.

Page 4-261, paragraph 5. The EIS/EIR states: "Project noise levels during decommissioning of the wellfield and power plant facilities and transmission line facilities, would be similar to those described for construction, as similar equipment would be used." This statement is inadequate. The EIS/EIR needs to provide

information regarding the types of equipment, noise levels, and duration of impact in relation to receptor locations if the EIS/EIR intends to provide a real analysis of the impacts of decommissioning.

Page 4-267, paragraph 2. This paragraph states: "The noise effects of decommissioning the proposed facilities is expected to be less than noise levels and associated effects identified for construction of the proposed facilities because well drilling would not occur." However, noise levels during "construction" (estimated at 18 to 36 months) are considered a significant impact. Decommissioning noise levels may also be significant even if these levels are less than construction-related noise levels. The EIS/EIR's analysis does not describe potential noise sources nor the effects of these sources and thus, adds nothing to the noise analysis. AG.374

G. Failure to Identify Applicable Noise Standards

Page 4-256, paragraph 3. The EIS/EIR refers to the GRO noise standard in this paragraph. The EIS/EIR uses this Leq level of 65 dBA to derive an Ldn of 72 dBA (the correct calculation would actually be 71 dBA). As previously stated, the two descriptors, Leq and Ldn, are not interchangeable and measure different noise impacts. The criteria defined here refer to Leq or ambient noise and not Ldn or 24-hour penalty-weighted community noise. AG.375

Page 4-256, paragraph 4. The EIS/EIR incorrectly concludes that, for the purposes of noise impact assessment, land use in the National Forest is most closely compatible to a neighborhood park, playground or residential area of a city or town. The actual land use described as an acceptable level for a 60 dBA in the Siskiyou County General Plan is not described as "park" but rather as "neighborhood park," which is a different type of land use altogether (Siskiyou County Noise Element page 54). The acceptable residential noise level of 60 dBA Ldn would apply to receptors in residential areas such as Tionesta and the developed portions of Medicine Lake. However, the low level and principally low-impact land uses in National Forests described in the EIS/EIR would conform more closely to "open space" land use compatible with an Ldn of 50 dBA. AG.376

Page 4-256, paragraph 5. This paragraph describes compatibility standards from the Modoc County General Plan that would be relevant to the impact assessment. Modoc County apparently has no applicable standard for open space or natural areas that would apply to non-residential sensitive receptors for this project. The 70 dBA Ldn noise compatibility level for areas with active recreational uses would not apply to the low level and principally low-impact recreational uses in the National Forest. Also, the 70 dBA Ldn does not reflect any of the noise levels monitored for the EIS/EIR noise analysis. A 70 dBA Ldn would more likely be recorded at a water slide park than on a hiking trail. AG.377

The Modoc County General Plan Noise Element states that: "The County is a quiet place. Very few minor, intrusive noise sources either exist or are proposed for the area. The only issue of any significance related to noise is the need to maintain this valuable quality so absent in many cities" (page 128). This also indicates that the 70 dBA level is inappropriate. The EIS/EIR should use the more appropriate Siskiyou County standard, as discussed above under Summary Comment 10.

Page 4-257, paragraph 5. The EIS/EIR author misinterprets the text of Appendix G of the CEQA Guidelines. The EIS/EIR states: "..significant noise impacts would be expected to occur if:

> ... [2nd bullet] Project operations substantially increase noise levels in areas of sensitive receptors".

AG.378

Appendix G actually states:" A project may be deemed to have a significant effect on the environment if it will: item (p) Increase substantially the ambient noise levels for adjoining areas." The key words here are " a project" and not "project operations". All facets of a project are to be included in the analysis of project impacts.

Page 4-258, paragraph 3. The EIS/EIR applies Leq levels as significance criteria based on Ldn levels for dissimilar land uses. The EIS/EIR derives an Leq of 54 dBA from the General Plan community noise level of 60 Ldn for residential areas, neighborhood parks and playgrounds -- this is clearly not the land use type in the National Forest lands (see also comments for page 4-256, paragraphs 4 and 5).

The EIS/EIR converts the noise compatibility standard from the Siskiyou County General Plan from Ldn to Leq. The County standard is <u>not</u> 54 dBA but rather an Ldn of 60 dBA. These two noise levels are not interchangeable but apply to differing concepts -- ambient noise versus community noise. The impact of project noise should be based on significance criteria which address the CEQA impact of an substantial increase in ambient noise (Leq) apart from conformance with General Plan compatibility levels (Ldn).

AG.379

If the reasoning of the EIS/EIR author were applied to the appropriate land use compatibility level for open space of an Ldn of 50 dBA , the derived Leq would be 44 dBA — a more appropriate Leq level to determine impacts given the low levels of ambient noise recorded for the EIS/EIR noise assessment.

Page 4-262, paragraph 1. The conclusion of significant noise impact is based on General Plan standards that do not apply to typical National Forest land uses. The applicability of residential noise standards to forest lands is not justified (see comments for page 4-256, paragraphs 4 and 5). The impact area and sensitive receptors should be mapped to demonstrate the extent of impact (see Summary of Comments, items #1, #2, #7 and #8). Impacts are either significant or less than

AG.380

significant — there is no short-term significant impact (see comment for Page 4-260, paragraph 3).

Page 4-261, paragraph 3. The EIS/EIR applies the Leq of 54 dBA derived from the compatibility standard of 60 dBA Ldn for residential land use to assess impacts of the operational project. The significance criteria used are inappropriate for the assessment of noise impacts and do not conform from a jurisdictional, CEQA or land use standpoint (see comments for page 4-256, paragraphs 4 and 5; also comment 2a under Introductory Comments and 10. under Summary Comments).

AG.381

H. Insufficient Information About the Noise Analysis Methodology

Power plant and wellfield construction, which are expected to last 18 to 36 months, should not be considered short term activities. Contrary to the statement of the EIS/EIR, noise threshold criteria are also applied to construction-related noise generation. Often, if these levels exceed compatibility standards, the project is then assessed with reference to the duration of the construction period and the limitations on hours and days imposed by ordinances, such as a grading ordinance or noise ordinance, in order to assess the degree of impact. An 18 to 36 month construction project (wellfields and power plant) is a vast stretch of the concept of the definition of short-term, particularly as well-drilling will continue during the life of the project.

AG.382

Page 3-191. The noise analysis conducted by Consultants in Engineering Acoustics should be attached to the EIS/EIR as an appendix. The Appendix should include:

- any reports, letter reports or memoranda prepared by the acoustical consultant for the EIS/EIR consultant;
- information on the methodology used for field collection of data, including specifics on each location measured, the type of equipment used, the time periods and dates monitored, weather conditions, primary noise sources during the monitoring period, and a schematic drawing of the location and the noise meter position.
- a description of the methodologies used and an explanation of why the methodologies were selected for a) measuring ambient noise levels, b) measuring or deriving equipment noise levels, and c) the evaluation of octave band noise. If equipment noise is derived from the manufacturer or from similar equipment at other installations, the source materials should be listed in the appendix. If derived from direct monitoring at other facilities, those dates and locations should be listed. Differences between the proposed project and any equipment used to simulate project impacts should be identified and described as to the relative noise generation of the proposed

AG.383

project. The methodology should identify the distances used in noise analysis for attenuation of noise sources and the calculation used for attenuation including attenuating factors and barriers.

- Field notes and data files from monitoring equipment.

Page 3-191, paragraph 4. The noise descriptor Ldn is defined here, on page 3-193 paragraph 4, and again in footnote 2 in Table 3-14-2 but no Ldn values for the sensitive receptors are presented in the entire section. AG.384

Page 3-191, paragraph 5 states that "In terms of community response, it is generally valid that a change in noise level of at least 5 dBA is required before any noticeable change in community response would be expected." No citation is provided for this statistic. The 5 dBA increase in ambient noise identified by the EIS/EIR should be used as the threshold for significant impact or another standard should be identified, as discussed in Summary Comment 11 above. AG.385

Page 4-257, paragraph 1 through 4. These paragraphs purport to describe the elaborate noise model constructed to assess project impacts but the discussion of methodology is very misleading. Confusion stems from the following:

- The EIS/EIR author refers to source materials for noise levels of similar projects but does not identify either the similarities between the projects nor the noise levels recorded.
- The EIS/EIR author discusses a seemingly complex noise model that was used "to determine projected noise levels at identified receptor locations." Paragraphs 2 and 3 discuss the effects of hemispheric spreading, atmospheric absorption, barriers, wind and heat, etc., but there is no indication that any of these factors were employed. AG.386
- No information from the cited source "Power Plant Noise Guide" appears to have been used in the "mathematical noise model."
- The only calculations clearly used are the simple attenuation calculation used for stationary noise sources, i.e. a reduction of 6 dB as distance doubles.

Page 4-258, paragraph 5. The EIS/EIR assigns a noise level of 83 dBA to each of four pieces of heavy equipment that would be used during construction, but it does not identify the source of the noise level data. It also does not explain its calculation of 83 dBA or present the composite noise level of more than one piece of equipment operating concurrently. The composite noise level is the relevant measurement needed to assess the noise impact. The EIS/EIR states that equipment would AG.387

operate at idle for 50% of the time, but it does not give a noise level for idling equipment or cite any source for project operations. A reference should be cited for the estimate of 83 dBA that would be generated by these pieces of equipment. These are noise levels which can easily be obtained from manufacturers or other sources. The composite noise of operating equipment can then easily be calculated for a distance of 100 feet.

Page 4-259, paragraph 4. The EIS/EIR states that it assumes an interior noise level of 85 dBA because it is the maximum level allowed by OSHA. The EIS/EIR does not state that this interior noise level is feasible to achieve with the equipment required for this project. AG.388

Exterior noise levels are relevant levels by which to assess environmental effects on receptors. However, no exterior noise levels are given nor are the noise levels of the project noise sources identified. The impacts of this facility cannot be assessed without establishing noise levels from a similar facility or similar assemblage of equipment.

I. Alternative Transmission Line Alignments

1. Failure to Assess Alternative Transmission Line Alignments

Page 3-196, paragraph 2. The discussion of the noise environment for the Alternative alignments is limited to one sentence -- "Existing ambient noise levels in the vicinity of each alternative and at sensitive receptors near each alternative are the same as described for the proposed action." It is not explained how this conclusion was reached. AG.389

Alternative alignments would be expected to have different sets of receptors. If this is not the case, then the EIS/EIR should clearly state that there are no recreational uses or permanent residences along the alternative alignments. The statement that the ambient noise levels are the same as those monitored in the Medicine Lake area is unsupported.

2. Insufficient Information Regarding Alternatives

Page 4-270 re: Alternative 2. The EIS/EIR states in paragraph 1 that there would be significant impacts with Alternative 2 to the Dry Lake area. The EIS/EIR does not identify the recepters, land use activities, or how many receptors would be affected in the Dry Lake area. AG.390

Page 4-270 and 4-271 re: Alternative 3. Land use activities and the presence/absence of sensitive receptors for Alternative 3 are not discussed. AG.391

Page 4-271 re: Alternative 4. Land use activities and the presence/absence of sensitive receptors for outside Tionesta or Medicine Lake are not discussed. Significant impacts to the Dry Lake area are not identified like they are in Alternative 2. AG.392

Page 4-271 re: Alternative 5. The EIS/EIR does not differentiate between recreational use patterns for alternatives A1 and A3. No information is presented about the alternative route and the presence/absence of sensitive receptors. AG.393

Page 4-272 re: Alternative 6. The EIS/EIR does not differentiate between forest usage for A1 and A3. No information is presented about the alternative route and the presence/absence of sensitive receptors. Significant impacts to the Dry Lake area are not identified. AG.394

4.15 Human Health and Safety

A. Failure to Discuss Effects of Transmission Lines on Fire Fighting

The EIS/EIR discusses transmission lines as a cause of fire but does not discuss the impacts of a transmission line on efforts to fight wild fires in the area. Fires in wildland areas with few roads and mountainous terrain are often fought using aircraft dropping water or fire-retardant chemicals. This is the practice of the USFS (e.g. in southern California) (*Devers-Serrano EIS/EIR (see Footnote 1)*). The EIS/EIR needs to address whether there is aerial fire fighting practiced in the Klamath and Modoc National Forests, and if so, whether existence of a new transmission line would pose a hazard to fire-fighting aircraft or impede efforts (e.g. of the USFS or California Department of Forestry) to fight fires in the area of the line. The EIS/EIR should compare the project alternatives with respect to this potential hazard. AG.395

B. Failure to Discuss Effects of Transmission Line on Aircraft

Transmission lines are a well-known hazard to aircraft, especially small civil aviation aircraft. In addition, airplane collisions with power lines are a well-known source of fires in both urban and wildland areas. The EIS/EIR needs to address what aircraft (in addition to the helicopters mentioned) are likely to be in the area, and whether there are any air strips (public or private) in the vicinity of the transmission line corridors for which the transmission line could pose a hazard to aircraft during takeoffs or landings. The EIS/EIR should compare the project alternatives with respect to this potential hazard. AG.396

Conclusion

The foregoing comments make it clear that the present EIS/EIR is fraught with deficiencies and contradictory statements. There is insufficient information presented to discriminate significant from less-than-significant effects of the major project components on cultural resources, traditional cultural values, vegetation, wildlife, visual quality, land use and recreation, noise, and human health and safety. The proposed mitigation measures are inadequate and are not related to realistic, quantitative standards of significance. There is inadequate information presented to determine which alternative or alternatives are environmentally superior to the proposed action, and whether the preference for particular alternatives is based on significant effects. AG.397

The EIS/EIR in its present form presents inadequate information for the public or lead agencies to determine whether the project will have significant, unavoidable impacts on the environment, which alternatives or mitigation measures would minimize significant impacts, and whether the project should be approved. The EIS/EIR must be substantially re-written and re-circulated a second time as a draft EIS/EIR for public review.

Thank you for the opportunity to provide these comments.

Sincerely yours,

Victoria Harris

Karen G. Weissman, Ph.D., Principal (by VH)
Victoria Harris, Senior Associate
Wendy Poinsot, Associate

Bibliographic References

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Gladwin, D.N., Asherin, D.A and K.M. Manci, 1987. Effects of aircraft noise and sonic booms on fish and wildlife: Results of a survey of U.S. Fish and Wildlife Service endangered species and ecological services field offices, refuges, hatcheries, and research centers. NERC-88/30. USFWS, National Ecology Research Center, Fort Collins, CO. 24 pp.

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National Park Service, 1994. Report to Congress, Report on effects of aircraft overflights on the National Park System.

USDA Forest Service, California Public Utilities Commission. January 1983. Southern California Edison Devers-Valley 500 kV, Serrano-Valley 500 kV and Serrano-Villa Park 220 kV Transmission Line Project, Supplemental Draft Environment Document (EIS/EIR).

Listed Species in SISKIYOU County

COMMON NAME	SCIENTIFIC NAME	FEDERAL STAT
BALD EAGLE	HALIAEETUS LEUCOCEPHALUS	Threatened
SWAINSONS HAWK	BUTEO SWAINSONI	None
GREATER SANDHILL CRANE	GRUS CANADENSIS TABIDA	None
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	Threatened
WESTERN YELLOW BILLED CUCKOO	COCCYZUS AMERICANUS OCCIDENTALIS	None
NORTHERN SPOTTED OWL	STRIX OCCIDENTALIS CAURINA	Threatened
WILLOW FLYCATCHER	EMPIDONAX TRAILLII	None
BANK SWALLOW	RIPARIA RIPARIA	None
SHORTNOSE SUCKER	CHASMISTES BREVIROSTRIS	Endangered
LOST RIVER SUCKER	DELTISTES LUXATUS	Endangered
SIERRA NEVADA RED FOX	VULPES VULPES NECATOR	Sp of Concer
CALIFORNIA WOLVERINE	GULO GULO LUTEUS	Sp of Concer
SISKIYOU MOUNTAINS SALAMANDER	PLETHODON STORMI	Sp of Concer
ASHLAND THISTLE	CIRSIUM CILIOLATUM	Category 3B
MCDONALD'S ROCK CRESS	ARABIS MACDONALDIANA	Endangered
TRINITY BUCKWHEAT	ERIOGONUM ALPINUM	Sp of Concer
YREKA PHLOX	PHLOX HIRSUTA	Candidate
SISKIYOU MARIPOSA LILY	CALOCHORTUS PERSISTENS	Sp of Concer
SLENDER ORCUTT GRASS	ORCUTTIA TENUIS	Proposed Thr

Totals
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13 Animals
6 Plants

Main Return to species by county.

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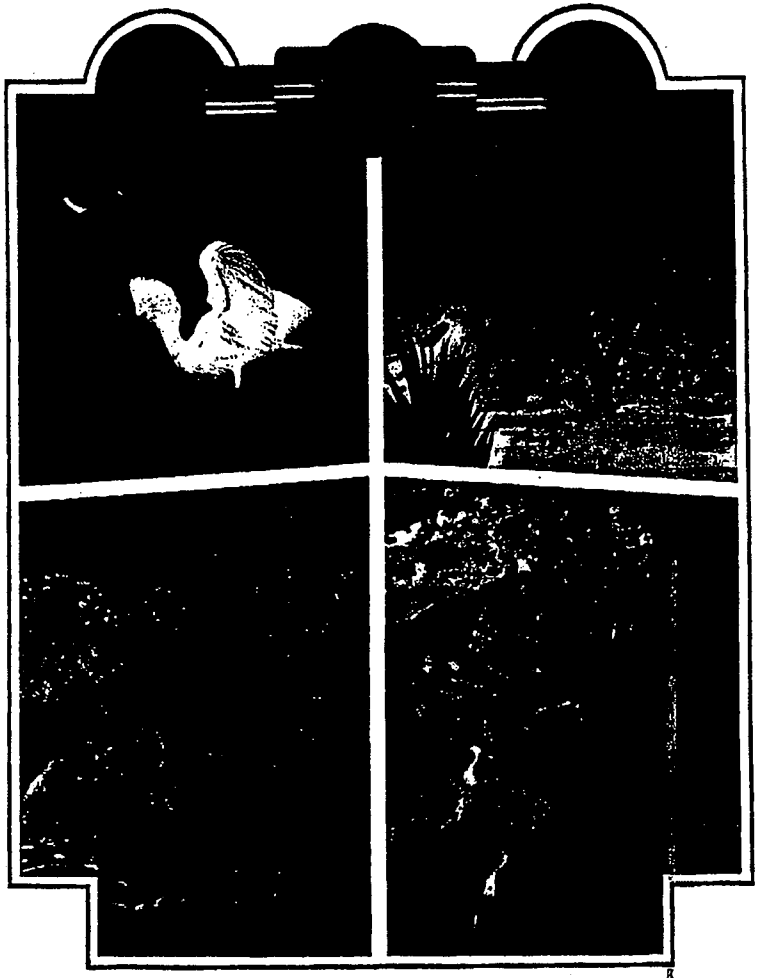


CALIFORNIA'S WILDLIFE

VOLUME III
MAMMALS

M159 Wolverine *Gulo gulo*

Family: Mustelidae **Order:** Carnivora **Class:** Mammalia
Management Status: California Threatened, California Fully Protected **Date:** April 23, 1984

DISTRIBUTION, ABUNDANCE, AND SEASONALITY

A scarce resident of North Coast mountains and Sierra Nevada. Sightings range from Del Norte and Trinity cos. east through Siskiyou and Shasta cos., and south through Tulare Co. A few possible sightings occur in the north coastal region as far south as Lake Co. Habitat distribution in California is poorly known for the North Coast and northern Sierra Nevada. In north coastal areas, has been observed in Douglas-fir and mixed conifer habitats, and probably uses red fir, lodgepole, wet meadow, and montane riparian habitats. Most sightings in this region range from 500-1500 m (1600-4800 ft). In the northern Sierra Nevada, have been found in mixed conifer, red fir, and lodgepole habitats, and probably use subalpine conifer, alpine dwarf-shrub, wet meadow, and montane riparian habitats. Elevations in the northern Sierra Nevada mostly fall in the range of 1300-2300 m (4300-7300 ft). Habitats used in the southern Sierra Nevada include red fir, mixed conifer, lodgepole, subalpine conifer, alpine dwarf-shrub, barren, and probably wet meadows, montane chaparral, and Jeffrey pine. Elevations in the southern Sierra Nevada mostly are from 2000-3400 m (6400-10,800 ft). May travel extensively. There are indications that wolverines may be increasing in California (Grinnell *et al.* 1937, Ingles 1965, Yocom 1973, 1974, Johnson 1977, Schempf and White 1977, California Department of Fish and Game 1980a).

SPECIFIC HABITAT REQUIREMENTS

Feeding: Feed primarily on small mammals and carrion (Grinnell *et al.* 1937, Ingles 1965, Hornocker and Hash 1981, Krott 1982). Prey includes marmots, ground squirrels, gophers, mice, deer carcasses, other vertebrates, berries, and insects. May kill large snowbound prey, but most large prey found by scavenging carrion. May drive bears or mountain lions from carcasses. Forage in open to sparse tree habitats on ground, in trees, burrows, among rocks, in or under snow, and sometimes in shallow water. May locate prey under deep snow. Cache food.

Cover: Prefer areas with low human disturbance. Use caves, hollows in cliffs, logs, rock outcrops, and burrows for cover, generally in denser forest stages.

Reproduction: Den in caves, cliffs, hollow logs, cavities in the ground, under rocks; may dig dens in snow, or use old beaver lodges (Thomas 1979).

Water: Must drink water.

Pattern: Hunt in more open areas, using dense cover for resting and reproduction.

SPECIES LIFE HISTORY

Activity Patterns: Largely nocturnal, but may be active at any time of day. Active yearlong.

Seasonal Movements/Migration: Frequently travel long distances; may leave usual home range for many days. Travels may take them out of normal elevation and habitats.

Home Range: The yearly range in Montana was 422 km² (156 mi²) for males, and 388 km² (144 mi²) for females (Hornocker and Hash 1981). A hunting route circumscribed a range of about 2070 km² (800 mi²) (Gilbert 1970). Daily movements of up to 32 km (19.4 mi) occurred in Montana (Hornocker and Hash 1976), and can travel 10-15 km (6-9 mi) without rest (Nowak and Paradiso 1983). Distances between locations ranged from 5-133 km (3.1-81 mi) (Hornocker and Hash 1976). The size and shape of a home range is not affected by mountains, rivers, highways, or other major topographical features. Wide-ranging young males may colonize new ranges. Hornocker and Hash (1981) reported a density of 1/65 km² (25 mi²).

Territory: May be intolerant of one another, and scent mark their home ranges. Individuals of the same sex and yearlings may be driven out (Krott 1982), but there is much overlap between home ranges. Spacing is maintained in time, but not space (Hornocker and Hash 1981), thus territorial defense is infrequent. Several females may have home ranges within the range of a single male.

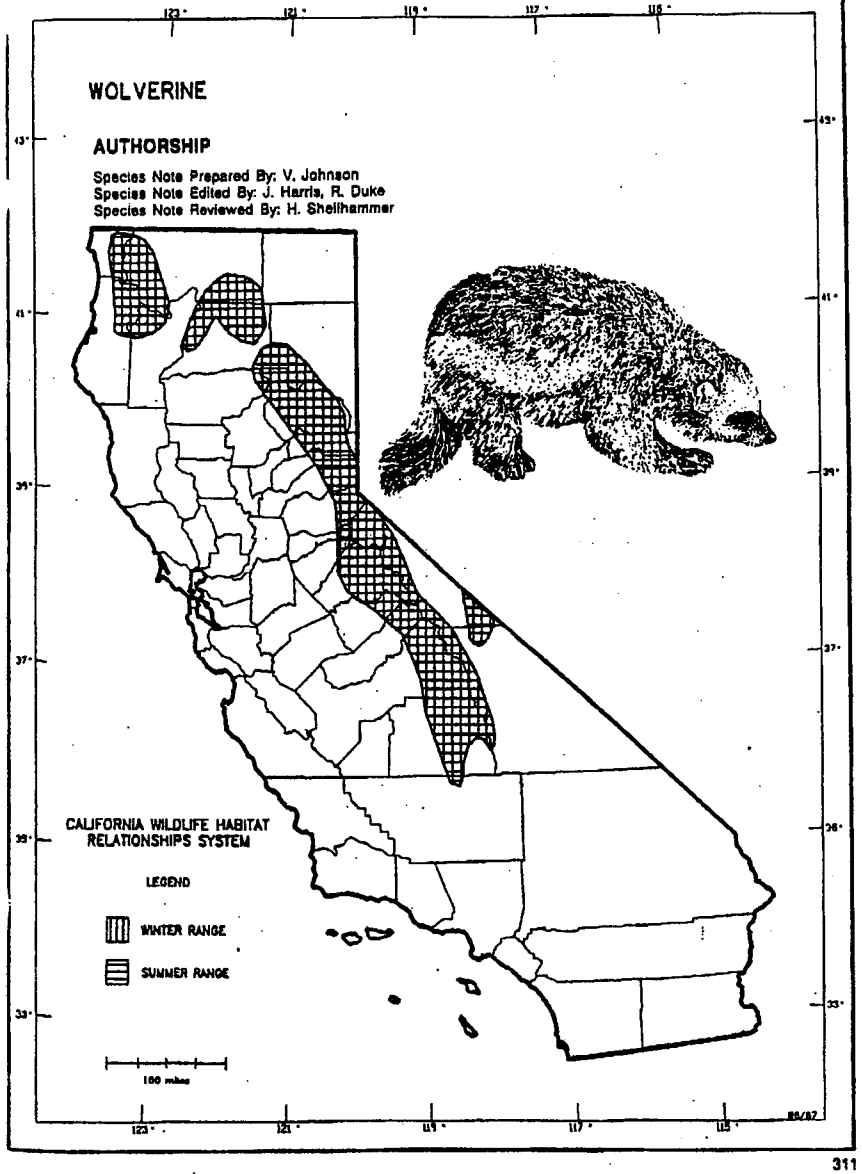
Reproduction: Probably polygamous, and mate from May to July. Active gestation is 30-40 days, but because of delayed implantation, full gestation period may last 215-272 days. The young are born from January through April. One litter/yr produced, averaging 3.5 (usually 2-4, ranging from 1-5). Young weaned in 7-9 wk, and sexually mature in second or third yr. Not all females reproduce each year (Wright and Rausch 1955, Rausch and Pearson 1972, Hornocker and Hash 1981, Nowak and Paradiso 1983). A captive individual lived 17 yr.

Niche: A predator and scavenger. It may benefit from the kills of mountain lions. Predation usually is not an important source of mortality, but in one study wolves preyed on wolverines (Krott 1982).

Comments: Have low population densities, even in best of range. Probably never common in California. Trapping, human disturbance, and grazing of high Sierra Nevada meadows have contributed to decline, a trend which may now be reversing (Schempf and White 1977).

REFERENCES

Grinnell *et al.* 1937, Quick 1953, Wright and Rausch 1955, Krott 1960, 1982, Ingles 1965, Gilbert 1970, Rausch and Pearson 1972, Ewer 1973, Yocom 1973, 1974, Haley 1975, Hornocker and Hash 1976, 1981, Johnson 1977, Schempf and White 1977, Thomas 1979, California Department of Fish and Game 1980a, Wilson 1982, Nowak and Paradiso 1983.



M147 Red Fox *Vulpes vulpes*

Family: Canidae **Order:** Carnivora **Class:** Mammalia
Management Status: *V. v. necator*, California Threatened, Forest Service Sensitive. **Date:** April 23, 1984

DISTRIBUTION, ABUNDANCE, AND SEASONALITY

Rare in Sierra Nevada, but widely distributed in lowlands in central and southern California. The native subspecies *V. v. necator* is found in Cascades, in Siskiyou Co., and from Lassen Co. south to Tulare Co. Introduced populations inhabit Sacramento and San Joaquin valleys and scattered coastal and inland locations from Sonoma Co. south to Monterey Co., and east to Stanislaus Co., as well as in Ventura, Los Angeles, and Orange cos. Sierra Nevada populations may be found in a variety of habitats, including alpine dwarf-shrub, wet meadow, subalpine conifer, lodgepole pine, red fir, aspen, montane chaparral, montane riparian, mixed conifer, and ponderosa pine. Jeffrey pine, eastside pine, and montane hardwood-conifer also are used. Populations in central and southern California occur in annual and perennial grassland, coastal scrub, wet meadow, emergent wetland, and cropland habitats, and may use mixed chaparral and chamise-redshank chaparral (Grinnell *et al.* 1937, Ingles 1965, Ewer 1973, Ables 1975, Gray 1975, 1977, Schempf and White 1977, Gould 1980). Most sightings in Sierra Nevada above 2200 m (7000 ft), ranging from 1200-3700 m (3900-11,900 ft) (Schempf and White 1977). Sightings in central and southern California below 914 m (3000 ft) (Schempf and White 1977).

SPECIFIC HABITAT REQUIREMENTS

Feeding: Hunts small and medium-sized mammals, ground squirrels, gophers, mice, marmots, woodrats, pikas, and rabbits. Apparently an increasingly important predator of ground-nesting waterfowl, shorebirds, upland game birds, and eggs in lowland California and other areas. Other vertebrates, insects, carrion, fruits, and earthworms used occasionally; carrion important in winter, as are lagomorphs. Hunts in meadows, fell-fields, grasslands, wetlands, and other open habitats. Caches food (Scott 1955, Scott and Klimstra 1955, Sargent 1972, 1978, Ewer 1973, MacDonald 1980, Maccarone and Montevecchi 1981, Samuel and Nelson 1982, Yoneda 1982).

Cover: Uses dense vegetation and rocky areas for cover and den sites.

Reproduction: Den sites include rock outcrops, hollow logs and stumps, and burrows in deep, loose soil (Grinnell *et al.* 1937, Ables 1975). May move pups to new den several times.

Water: Captive red foxes did not require free water as pups or adults (Sargent 1978).

Pattern: In Sierra Nevada, prefers forests interspersed with meadows or alpine fell-fields. Open areas are used for hunting, forested habitats for cover and reproduction. In lowlands, uses fence lines, hedgerows, woodlots, and other brushy, wooded areas for cover and reproduction, and hunts in cropland, wetland, urban habitats and other open areas (Grinnell *et al.* 1937, Ables 1975, Samuel and Nelson 1982).

SPECIES LIFE HISTORY

Activity Patterns: Active yearlong; hunts day and night (Grinnell *et al.* 1937, Ables 1975).

Seasonal Movements/Migration: None in many habitats. Sierra red foxes move downslope in winter into ponderosa pine and mixed conifer, upslope in summer to lodgepole pine, subalpine conifer, alpine dwarf-shrub, and red fir habitats (Grinnell *et al.* 1937, Schempf and White 1977).

Home Range: Summer home ranges in alpine and subalpine tundra of British Columbia averaged 1811 ha (3979 ac), varying from 277-3420 ha (684-8447 ac) (Jones and Theberge 1982). In Minnesota, Illinois, and Wisconsin, home ranges averaged 700 ha (1728 ac) and varied from 155-1554 ha (384-3840 ac) (Sargent 1972, Storm *et al.* 1976). Red foxes have been known to travel up to 395 km (245 mi). Home range size is influenced by food abundance and habitat.

Territory: The male defends the territory, which is shared by the mated pair and pups. Defense consists of display, scent-marking, chasing, and rare physical conflict (Preston 1975). The entire home range may be defended, or territoriality may break down in times of food abundance (Orr 1971, Zarnoch *et al.* 1977, Samuel and Nelson 1982).

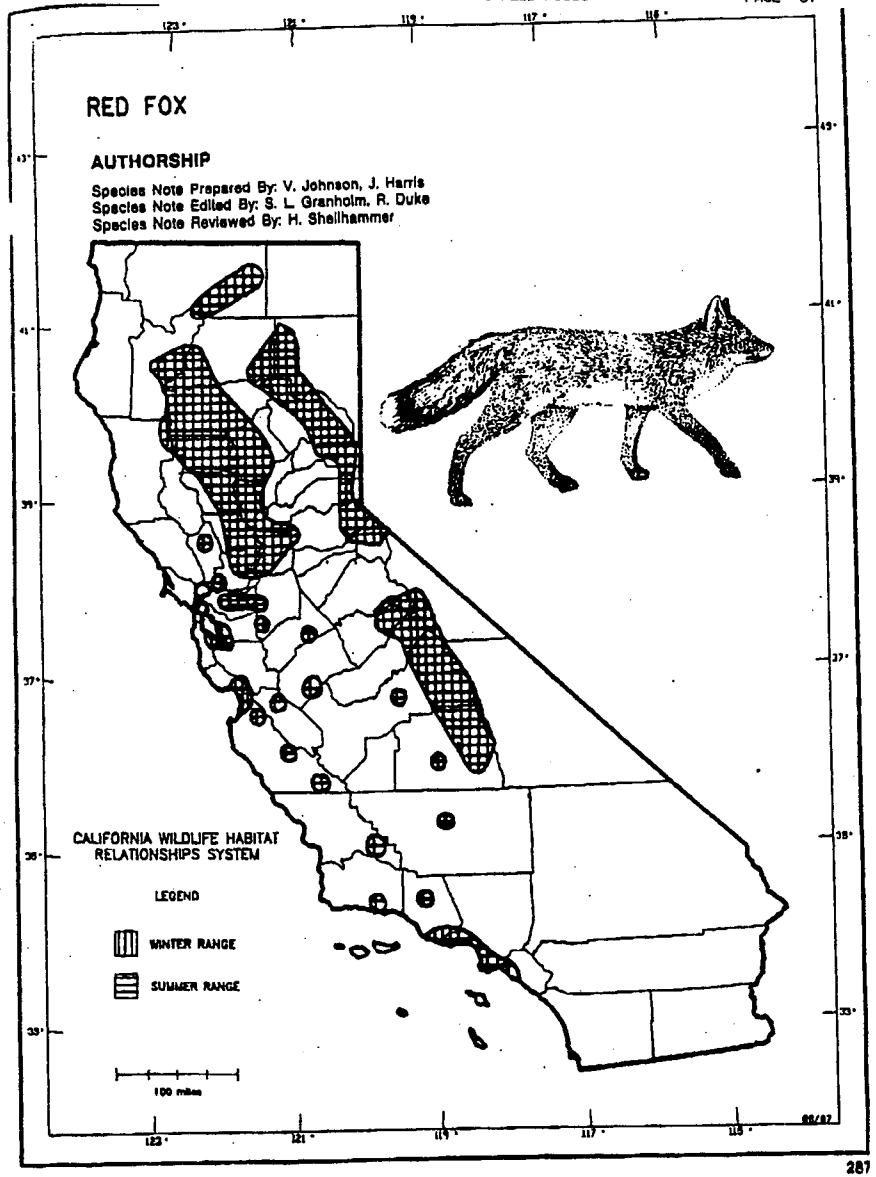
Reproduction: Mating takes place in late winter (January-March), and after a gestation period of 52 days, young born in early spring (March-May). Litter sizes in many studies averaged about 5. Most litters are 4-6, though range is 1-12 (Grinnell *et al.* 1937, Samuel and Nelson 1982). There is 1 litter/yr. Pups dependent on parents for 6 mo, and become sexually mature at 10 mo (Orr 1971, Zarnoch *et al.* 1977).

Niche: Coexists with coyotes in Sierra Nevada, and with gray and kit foxes and coyotes in lowland California. Numbers apparently increase when numbers of coyotes and other predators decrease, through predator control or natural factors (Schmidt 1986). Sierra Nevada populations apparently reduced by grazing in meadows, which reduces prey populations, and by trapping, logging, and recreational disturbance (Grinnell *et al.* 1937, Schempf and White 1977).

Comments: Sierra Nevada red foxes are rare, and numbers may be continuing to decline (Schempf and White 1977). Lowland populations, presumably introduced, are expanding in range and numbers (Gray 1977, Gould 1980).

REFERENCES

Grinnell *et al.* 1937, Scott 1955, Scott and Klimstra 1955, Ingles 1965, Ables 1968, 1969a, 1969b, 1975, Orr 1971, Sargent 1972, 1978, Ewer 1973, Gray 1975, 1977, Preston 1975, Storm *et al.* 1976, Schempf and White 1977, Zarnoch *et al.* 1977, California Department of Fish and Game 1980a, Gould 1980, MacDonald 1980, Maccarone and Montevecchi 1981, Jones and Theberge 1982, Samuel and Nelson 1982, Yoneda 1982, Schmidt 1986.



Staff Report regarding Mitigation for Impacts to Swainson's Hawks (*Buteo swainsoni*) in the Central Valley of California

INTRODUCTION

The Legislature and the Fish and Game Commission have developed the policies, standards and regulatory mandates which, if implemented, are intended to help stabilize and reverse dramatic population declines of threatened and endangered species. In order to determine how the Department of Fish and Game (Department) could judge the adequacy of mitigation measures designed to offset impacts to Swainson's hawks in the Central Valley, Staff (WMD, ESD and Regions) has prepared this report. To ensure compliance with legislative and Commission policy, mitigation requirements which are consistent with this report should be incorporated into: (1) Department comments to Lead Agencies and project sponsors pursuant to the California Environmental Quality Act (CEQA); (2) Fish and Game Code Section 2081 Management Authorizations (Management Authorizations); and (3) Fish and Game Code Section 2090 Consultations with State CEQA Lead Agencies.

The report is designed to provide the Department (including regional offices and divisions), CEQA Lead Agencies and project proponents the context in which the Environmental Services Division (ESD) will review proposed project specific mitigation measures. This report also includes "model" mitigation measures which have been judged to be consistent with policies, standards and legal mandates of the Legislature and Fish and Game Commission. Alternative mitigation measures, tailored to specific projects, may be developed if consistent with this report. Implementation of mitigation measures consistent with this report are intended to help achieve the conservation goals for the Swainson's hawk and should complement multi-species habitat conservation planning efforts currently underway.

The Department is preparing a recovery plan for the species and it is anticipated that this report will be revised to incorporate recovery plan goals. It is anticipated that the recovery plan will be completed by the end of 1995. The Swainson's hawk recovery plan will establish criteria for species recovery through preservation of existing habitat, population expansion into former habitat, recruitment of young into the population, and other specific recovery efforts.

During project review the Department should consider whether a proposed project will adversely affect suitable foraging habitat within a ten (10) mile radius of an active (used during one or more of the last 5 years) Swainson's hawk nest(s). Suitable Swainson's hawk foraging habitat will be those habitats and crops identified in Bechard (1983), Bloom (1980), and Estep (1989). The following vegetation types/agricultural crops are considered small mammal and insect foraging habitat

for Swainson's hawks:

- alfalfa
- fallow fields
- beet, tomato, and other low-growing row or field crops
- dry-land and irrigated pasture
- rice land (when not flooded)
- cereal grain crops (including corn after harvest)

The ten mile radius standard is the flight distance between active (and successful) nest sites and suitable foraging habitats, as documented in telemetry studies (Estep 1989, Babcock 1993). Based on the ten mile radius, new development projects which adversely modify nesting and/or foraging habitat should mitigate the project's impacts to the species. The ten mile foraging radius recognizes a need to strike a balance between the biological needs of reproducing pairs (including eggs and nestlings) and the economic benefit of development(s) consistent with Fish and Game Code Section 2053.

Since over 95% of Swainson's hawk nests occur on private land, the Department's mitigation program should include incentives that preserve agricultural lands used for the production of crops, which are compatible with Swainson's hawk foraging needs, while providing an opportunity for urban development and other changes in land use adjacent to existing urban areas.

LEGAL STATUS

Federal

The Swainson's hawk is a migratory bird species protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in Section 50 of the Code of Federal Regulations (C.F.R.) Part 10, including feathers or other parts, nests, eggs or products, except as allowed by implementing regulations (50 C.F.R. 21).

State

The Swainson's hawk has been listed as a threatened species by the California Fish and Game Commission pursuant to the California Endangered Species Act (CESA), see Title 14, California Code of Regulations, Section 670.5(b)(5)(A).

LEGISLATIVE AND COMMISSION POLICIES, LEGAL MANDATES AND STANDARDS

The FGC policy for threatened species is, in part, to: "Protect and preserve all native species...and their habitats...." This policy also directs the Department to work with all interested persons to protect and preserve sensitive resources and their habitats. Consistent with this policy and direction, the Department is enjoined to implement measures that assure protection for the Swainson's hawk.

The California State Legislature, when enacting the provisions of CESA, made the following findings and declarations in Fish and Game Code Section 2051:

a) "Certain species of fish, wildlife, and plants have been rendered extinct as a consequence of man's activities, untempered by adequate concern and conservation";

b) "Other species of fish, wildlife, and plants are in danger of, or threatened with, extinction because their habitats are threatened with destruction, adverse modification, or severe curtailment because of overexploitation, disease, predation, or other factors (emphasis added)";and

c) "These species of fish, wildlife, and plants are of ecological, educational, historical, recreational, esthetic, economic, and scientific value to the people of this state, and the conservation, protection, and enhancement of these species and their habitat is of statewide concern" (emphasis added).

The Legislature also proclaimed that it "is the policy of the state to conserve, protect, restore, and enhance any endangered or threatened species and its habitat and that it is the intent of the Legislature, consistent with conserving the species, to acquire lands for habitat for these species" (emphasis added).

Section 2053 of the Fish and Game Code states, in part, "It is the policy of the state that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species and or its habitat which would prevent jeopardy" (emphasis added).

Section 2054 states "The Legislature further finds and declares that, in the event specific economic, social, and or other conditions make infeasible such alternatives, individual projects may be approved if appropriate mitigation and enhancement measures are provided" (emphasis added).

Loss or alteration of foraging habitat or nest site disturbance which results in:

(1) nest abandonment; (2) loss of young; (3) reduced health and vigor of eggs and/ nestlings (resulting in reduced survival rates), may ultimately result in the ta (killing) of nestling or fledgling Swainson's hawks incidental to otherwise lawf activities. The taking of Swainson's hawks in this manner can be a violation Section 2080 of the Fish and Game Code. This interpretation of take has be judicially affirmed by the landmark appellate court decision pertaining to CES (DFG v. ACID, 8 CA App.4, 41554). The essence of the decision emphasized that th intent and purpose of CESA applies to all activities that take or kill endangered c threatened species, even when the taking is incidental to otherwise legal activitie To avoid potential violations of Fish and Game Code Section 2080, the Departmer recommends and encourages project sponsors to obtain 2081 Managemen Authorizations for their projects.

Although this report has been prepared to assist the Department in working with the development community, the prohibition against take (Fish and Game Code Section 2080) applies to all persons, including those engaged in agricultural activities and routine maintenance of facilities. In addition, sections 3503, 3503.5, and 3800 of the Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs.

To avoid potential violation of Fish and Game Code Section 2080 (i.e. killing of a listed species), project-related disturbance at active Swainson's hawk nesting sites should be reduced or eliminated during critical phases of the nesting cycle (March 1 - September 15 annually). Delineation of specific activities which could cause nest abandonment (take) of Swainson's hawk during the nesting period should be done on a case-by-case basis.

CEQA requires a mandatory findings of significance if a project's impacts to threatened or endangered species are likely to occur (Sections 21001 (c), 21083, Guidelines Sections 15380, 15064, 15065). Impacts must be avoided or mitigated to less than significant levels unless the CEQA Lead Agency makes and supports findings of Overriding Consideration. The CEQA Lead Agency's Findings of Overriding Consideration does not eliminate the project sponsor's obligation to comply with Fish and Game Code Section 2080.

NATURAL HISTORY

The Swainson's hawk (*Buteo swainsoni*) is a large, broad winged buteo which frequents open country. They are about the same size as a red-tailed hawk (*Buteo jamaicensis*), but trimmer, weighing approximately 800-1100 grams (1.75 - 2 lbs). They have about a 125 cm. (4+foot) wingspan. The basic body plumage may be highly variable and is characterized by several color morphs - light, dark, and rufous. In dark phase birds, the entire body of the bird may be sooty black. Adult birds generally have dark backs. The ventral or underneath sections may be light with a characteristic dark, wide "bib" from the lower throat down to the upper

breast, light colored wing linings and pointed wing tips. The tail is gray ventrally with a subterminal dusky band, and narrow, less conspicuous barring proximally. The sexes are similar in appearance; females however, are slightly larger and heavier than males, as is the case in most sexually dimorphic raptors. There are no recognized subspecies (Palmer 1988).

The Swainson's hawk is a long distance migrator. The nesting grounds occur in northwestern Canada, the western U.S., and Mexico and most populations migrate to wintering grounds in the open pampas and agricultural areas of South America (Argentina, Uruguay, southern Brazil). The species is included among the group of birds known as "neotropical migrants". Some individuals or small groups (20-30 birds) may winter in the U.S., including California (Delta Islands). This round trip journey may exceed 14,000 miles. The birds return to the nesting grounds and establish nesting territories in early March.

Swainson's hawks are monogamous and remain so until the loss of a mate (Palmer 1988). Nest construction and courtship continues through April. The clutch (commonly 3-4 eggs) is generally laid in early April to early May, but may occur later. Incubation lasts 34-35 days, with both parents participating in the brooding of eggs and young. The young fledge (leave the nest) approximately 42-44 days after hatching and remain with their parents until they depart in the fall. Large groups (up to 100+ birds) may congregate in holding areas in the fall and may exhibit a delayed migration depending upon forage availability. The specific purpose of these congregation areas is as yet unknown, but is likely related to: increasing energy reserves for migration; the timing of migration; aggregation into larger migratory groups (including assisting the young in learning migration routes); and providing a pairing and courtship opportunity for unattached adults.

Foraging Requirements

Swainson's hawk nests in the Central Valley of California are generally found in scattered trees or along riparian systems adjacent to agricultural fields or pastures. These open fields and pastures are the primary foraging areas. Major prey items for Central Valley birds include: California voles (*Microtus californicus*), valley pocket gophers (*Thomomys bottae*), deer mice (*Peromyscus maniculatus*), California ground squirrels (*Spermophilus beecheyi*), mourning doves (*Zenaida macroura*), ring-necked pheasants (*Phasianus colchicus*), meadowlarks (*Sturnella neglecta*), other passerines, grasshoppers (*Conocephalinae* sp.), crickets (*Gryllidae* sp.), and beetles (Estep 1989). Swainson's hawks generally search for prey by soaring in open country and agricultural fields similar to northern hariers (*Circus cyaneus*) and ferruginous hawks (*Buteo regalis*). Often several hawks may be seen foraging together following tractors or other farm equipment capturing prey escaping from farming operations. During the breeding season, Swainson's hawks eat mainly vertebrates (small rodents and reptiles), whereas during migration vast numbers of insects are consumed (Palmer 1988).

Department funded research has documented the importance of suitable foraging habitats (e.g., annual grasslands, pasture lands, alfalfa and other hay crops, and combinations of hay, grain and row crops) within an energetically efficient flight distance from active Swainson's hawk nests (Estep pers. comm.). Recent telemetry studies to determine foraging requirements have shown that birds may use in excess of 15,000 acres of habitat or range up to 18.0 miles from the nest in search of prey (Estep 1989, Babcock 1993). The prey base (availability and abundance) for the species is highly variable from year to year, with major prey population (small mammals and insects) fluctuations occurring based on rainfall patterns, natural cycles and agricultural cropping and harvesting patterns. Based on these variables, significant acreages of potential foraging habitat (primarily agricultural lands) should be preserved per nesting pair (or aggregation of nesting pairs) to avoid jeopardizing existing populations. Preserved foraging areas should be adequate to allow additional Swainson's hawk nesting pairs to successfully breed and use the foraging habitat during good prey production years.

Suitable foraging habitat is necessary to provide an adequate energy source for breeding adults, including support of nestlings and fledglings. Adults must achieve an energy balance between the needs of themselves and the demands of nestlings and fledglings, or the health and survival of both may be jeopardized. If prey resources are not sufficient, or if adults must hunt long distances from the nest site, the energetics of the foraging effort may result in reduced nestling vigor with an increased likelihood of disease and/or starvation. In more extreme cases, the breeding pair, in an effort to assure their own existence, may even abandon the nest and young (Woodbridge 1985).

Prey abundance and availability is determined by land and farming patterns including crop types, agricultural practices and harvesting regimes. Estep (1989) found that 73.4% of observed prey captures were in fields being harvested, disced, mowed, or irrigated. Preferred foraging habitats for Swainson's hawks include:

- alfalfa;
- fallow fields;
- beet, tomato, and other low-growing row or field crops;
- dry-land and irrigated pasture;
- rice land (during the non-flooded period); and
- cereal grain crops (including corn after harvest).

Unsuitable foraging habitat types include crops where prey species (even if present) are not available due to vegetation characteristics (e.g. vineyards, mature orchards, and cotton fields, dense vegetation).

Nesting Requirements

Although the Swainson's hawk's current nesting habitat is fragmented and unevenly distributed, Swainson's hawks nest throughout most of the Central Valley floor. More than 85% of the known nests in the Central Valley are within riparian systems in Sacramento, Sutter, Yolo, and San Joaquin counties. Much of the potential nesting habitat remaining in this area is in riparian forests, although isolated and roadside trees are also used. Nest sites are generally adjacent to or within easy flying distance to alfalfa or hay fields or other habitats or agricultural crops which provide an abundant and available prey source. Department research has shown that valley oaks (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*), willows (*Salix* spp.), sycamores (*Platanus* spp.), and walnuts (*Juglans* spp.) are the preferred nest trees for Swainson's hawks (Bloom 1980, Schlorff and Bloom 1983, Estep 1989).

Fall and Winter Migration Habitats

During their annual fall and winter migration periods, Swainson's hawks may congregate in large groups (up to 100+ birds). Some of these sites may be used during delayed migration periods lasting up to three months. Such sites have been identified in Yolo, Tulare, Kern and San Joaquin counties and protection is needed for these critical foraging areas which support birds during their long migration.

Historical and Current Population Status

The Swainson's hawk was historically regarded as one of the most common and numerous raptor species in the state, so much so that they were often not given special mention in field notes. The breeding population has declined by an estimated 91% in California since the turn of the century (Bloom 1980). The historical Swainson's hawk population estimates are based on current densities and extrapolated based on the historical amount of available habitat. The historical population estimate is 4,284-17,136 pairs (Bloom 1980). In 1979, approximately 375 (± 50) breeding pairs of Swainson's hawks were estimated in California, and 280 (75%) of those pairs were estimated to be in the Central Valley (Bloom 1980). In 1988, 241 active breeding pairs were found in the Central Valley, with an additional 78 active pairs known in northeastern California. The 1989 population estimate was 430 pairs for the Central Valley and 550 pairs statewide (Estep, 1989). This difference in population estimates is probably a result of increased survey effort rather than an actual population increase.

Reasons for decline

The dramatic Swainson's hawk population decline has been attributed to loss of

native nesting and foraging habitat, and more recently to the loss of suitable nesting trees and the conversion of agricultural lands. Agricultural lands have been converted to urban land uses and incompatible crops. In addition, pesticides, shooting, disturbance at the nest site, and impacts on wintering areas may have contributed to their decline. Although losses on the wintering areas in South America may occur, they are not considered significant since breeding populations outside of California are stable. The loss of nesting habitat within riparian areas has been accelerated by flood control practices and bank stabilization programs. Smith (1977) estimated that in 1850 over 770,000 acres of riparian habitat were present in the Sacramento Valley. By the mid-1980s, Warner and Hendrix (1984) estimated that there was only 120,000 acres of riparian habitat remaining in the Central Valley (Sacramento and San Joaquin Valleys combined). Based on Warner and Hendrix's estimates approximately 93% of the San Joaquin Valley and 73% of the Sacramento Valley riparian habitat has been eliminated since 1850.

MANAGEMENT STRATEGIES

Management and mitigation strategies for the Central Valley population of the Swainson's hawk should ensure that:

- suitable nesting habitat continues to be available (this can be accomplished by protecting existing nesting habitat from destruction or disturbance and by increasing the number of suitable nest trees); and

- foraging habitat is available during the period of the year when Swainson's hawks are present in the Central Valley (this should be accomplished by maintaining or creating adequate and suitable foraging habitat in areas of existing and potential nest sites and along migratory routes within the state).

A key to the ultimate success in meeting the Legislature's goal of maintaining habitat sufficient to preserve this species is the implementation of these management strategies in cooperation with project sponsors and local, state and federal agencies.

DEPARTMENT'S ROLES AND RESPONSIBILITIES IN PROJECT CONSULTATION AND ADMINISTRATION OF CEQA AND THE FISH AND GAME CODE

The Department, through its administration of the Fish and Game Code and its trust responsibilities, should continue its efforts to minimize further habitat destruction and should seek mitigation to offset unavoidable losses by (1) including the mitigation measures in this document in CEQA comment letters and/or as

management conditions in Department issued Management Authorizations or (2) by developing project specific mitigation measures (consistent with the Commission's and the Legislature's mandates) and including them in CEQA comment letters and/or as management conditions in Fish and Game Code Section 2081 Management Authorizations issued by the Department and/or in Fish and Game Code Section 2090 Biological Opinions.

The Department should submit comments to CEQA Lead Agencies on all projects which adversely affect Swainson's hawks. CEQA requires a mandatory findings of significance if a project's impacts to threatened or endangered species are likely to occur (Sections 21001 (c), 21083. Guidelines 15380, 15064, 15065). Impacts must be: (1) avoided; or (2) appropriate mitigation must be provided to reduce impacts to less than significant levels; or (3) the lead agency must make and support findings of overriding consideration. If the CEQA Lead Agency makes a Finding of Overriding Consideration, it does not eliminate the project sponsor's obligation to comply with the take prohibitions of Fish and Game Code Section 2080. Activities which result in (1) nest abandonment; (2) starvation of young; and/or (3) reduced health and vigor of eggs and nestlings may result in the take (killing) of Swainson's hawks incidental to otherwise lawful activities (urban development, recreational activities, agricultural practices, levee maintenance and similar activities. The taking of Swainson's hawk in this manner may be a violation of Section 2080 of the Fish and Game Code. To avoid potential violations of Fish and Game Code Section 2080, the Department should recommend and encourage project sponsors to obtain 2081 Management Authorizations.

In aggregate, the mitigation measures incorporated into CEQA comment letters and/or 2081 Management Authorizations for a project should be consistent with Section 2053 and 2054 of the Fish and Game Code. Section 2053 states, in part, "It is the policy of the state that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species and or its habitat which would prevent jeopardy". Section 2054 states: "The Legislature further finds and declares that, in the event specific economic, social, and or other conditions make infeasible such alternatives, individual projects may be approved if appropriate mitigation and enhancement measures are provided."

State lead agencies are required to consult with the Department pursuant to Fish and Game Code Section 2090 to ensure that any action authorized, funded, or carried out by that state agency will not jeopardize the continued existence of any threatened or endangered species. Comment letters to State Lead Agencies should also include a reminder that the State Lead Agency has the responsibility to consult with the Department pursuant to Fish and Game Code Section 2090 and obtain a written findings (Biological Opinion). Mitigation measures included in Biological Opinions issued to State Lead Agencies must be consistent with Fish and Game

Code Sections 2051-2054 and 2091-2092.

NEST SITE AND HABITAT LOCATION INFORMATION SOURCES

The Department's Natural Diversity Data Base (NDDB) is a continually updated, computerized inventory of location information on the State's rarest plants, animals, and natural communities. Department personnel should encourage project proponents and CEQA Lead Agencies, either directly or through CEQA comment letters, to purchase NDDB products for information on the locations of Swainson's hawk nesting areas as well as other sensitive species. The Department's Nongame Bird and Mammal Program also maintains information on Swainson's hawk nesting areas and may be contacted for additional information on the species.

Project applicants and CEQA Lead Agencies may also need to conduct site specific surveys (conducted by qualified biologists at the appropriate time of the year using approved protocols) to determine the status (location of nest sites, foraging areas, etc.) of listed species as part of the CEQA and 2081 Management Authorization process. Since these studies may require multiple years to complete, the Department shall identify any needed studies at the earliest possible time in the project review process. To facilitate project review and reduce the potential for costly project delays, the Department should make it a standard practice to advise developers or others planning projects that may impact one or more Swainson's hawk nesting or foraging areas to initiate communication with the Department as early as possible.

MANAGEMENT CONDITIONS

Staff believes the following mitigation measures (nos. 1-4) are adequate to meet the Commission's and Legislature's policy regarding listed species and are considered as preapproved for incorporation into any Management Authorizations for the Swainson's hawk issued by the Department. The incorporation of measures 1-4 into a CEQA document should reduce a project's impact to a Swainson's hawk(s) to less than significant levels. Since these measures are Staff recommendations, a project sponsor or CEQA Lead agency may choose to negotiate project specific mitigation measures which differ. In such cases, the negotiated Management Conditions must be consistent with Commission and Legislative policy and be submitted to the ESD for review and approval prior to reaching agreement with the project sponsor or CEQA Lead Agency.

Staff recommended Management Conditions are:

1. No intensive new disturbances (e.g. heavy equipment operation associated with construction, use of cranes or draglines, new rock crushing

activities) or other project related activities which may cause nest abandonment or forced fledging, should be initiated within 1/4 mile (buffer zone) of an active nest between March 1 - September 15 or until August 15 if a Management Authorization or Biological Opinion is obtained for the project. The buffer zone should be increased to 1/2 mile in nesting areas away from urban development (i.e. in areas where disturbance [e.g. heavy equipment operation associated with construction, use of cranes or draglines, new rock crushing activities] is not a normal occurrence during the nesting season). Nest trees should not be removed unless there is no feasible way of avoiding it. If a nest tree must be removed, a Management Authorization (including conditions to off-set the loss of the nest tree) must be obtained with the tree removal period specified in the Management Authorization, generally between October 1- February 1. If construction or other project related activities which may cause nest abandonment or forced fledging are necessary within the buffer zone, monitoring of the nest site (funded by the project sponsor) by a qualified biologist (to determine if the nest is abandoned) should be required. If it is abandoned and if the nestlings are still alive, the project sponsor shall fund the recovery and hacking (controlled release of captive reared young) of the nestling(s). Routine disturbances such as agricultural activities, commuter traffic, and routine facility maintenance activities within 1/4 mile of an active nest should not be prohibited.

2. Hacking as a substitute for avoidance of impacts during the nesting period may be used in unusual circumstances after review and approval of a hacking plan by ESD and WMD. Proponents who propose using hacking will be required to fund the full costs of the effort, including any telemetry work specified by the Department.

3. To mitigate for the loss of foraging habitat (as specified in this document), the Management Authorization holder/project sponsor shall provide Habitat Management (HM) lands to the Department based on the following ratios:

(a) Projects within 1 mile of an active nest tree shall provide:

- one acre of HM land (at least 10% of the HM land requirements shall be met by fee title acquisition or a conservation easement allowing for the active management of the habitat, with the remaining 90% of the HM lands protected by a conservation easement [acceptable to the Department] on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk) for each acre of development authorized (1:1 ratio); or

- one-half acre of HM land (all of the HM land requirements shall be met by fee title acquisition or a conservation easement

(acceptable to the Department) which allows for the active management of the habitat for prey production on the HM lands) for each acre of development authorized (0.5:1 ratio).

(b) Projects within 5 miles of an active nest tree but greater than 1 mile from the nest tree shall provide 0.75 acres of HM land for each acre of urban development authorized (0.75:1 ratio). All HM lands protected under this requirement may be protected through fee title acquisition or conservation easement (acceptable to the Department) on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk.

(c) Projects within 10 miles of an active nest tree but greater than 5 miles from an active nest tree shall provide 0.5 acres of HM land for each acre of urban development authorized (0.5:1 ratio). All HM lands protected under this requirement may be protected through fee title acquisition or a conservation easement (acceptable to the Department) on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk.

4. Management Authorization holders/project sponsors shall provide for the long-term management of the HM lands by funding a management endowment (the interest on which shall be used for managing the HM lands) at the rate of $400 per HM land acre (adjusted annually for inflation and varying interest rates).

Some project sponsors may desire to provide funds to the Department for HM land protection. This option is acceptable to the extent the proposal is consistent with Department policy regarding acceptance of funds for land acquisition. All HM lands should be located in areas which are consistent with a multi-species habitat conservation focus. Management Authorization holders/project sponsors who are willing to establish a significant mitigation bank (> 900 acres) should be given special consideration such as 1.1 acres of mitigation credit for each acre preserved.

PROJECT SPECIFIC MITIGATION MEASURES

Although this report includes recommended Management Measures, the Department should encourage project proponents to propose alternative mitigation strategies that provide equal or greater protection of the species and which also expedite project environmental review or issuance of a CESA Management Authorization. The Department and sponsor may choose to conduct cooperative, multi-year field studies to assess the site's habitat value and determine its use by nesting and foraging Swainson's hawk. Study plans should include clearly defined criteria for judging the project's impacts on Swainson's hawks and the methodologies (days of monitoring, foraging effort/efficiency, etc.) that will be used.

The study plans should be submitted to the Wildlife Management Division and ESD for review. Mitigation measures developed as a result of the study must be reviewed by ESD (for consistency with the policies of the Legislature and Fish and Game Commission) and approved by the Director.

EXCEPTIONS

Cities, counties and project sponsors should be encouraged to focus development on open lands within already urbanized areas. Since small disjunct parcels of habitat seldom provide foraging habitat needed to sustain the reproductive effort of a Swainson's hawk pair, Staff does not recommend requiring mitigation pursuant to CEQA nor a Management Authorization by the Department for infill (within an already urbanized area) projects in areas which have less than 5 acres of foraging habitat and are surrounded by existing urban development, unless the project area is within 1/4 mile of an active nest tree.

REVIEW

Staff should revise this report at least annually to determine if the proposed mitigation strategies should be retained, modified or if additional mitigation strategies should be included as a result of new scientific information.

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Thomas Reid Associates

Company Qualifications

Thomas Reid Associates (TRA) is well-qualified to provide environmental consulting services to governmental, private and non-profit clients. We have been a full-service environmental consultant since 1972, specializing in environmental impact analysis. We have a wide range of in-house expertise and have prepared environmental documents on a variety of projects including residential housing developments, planning documents, wastewater treatment programs, waste disposal projects and commercial and recreational developments. Other projects include mining reclamation plans and energy extraction, processing and transshipment, including high voltage transmission lines for electric power. TRA also prepares specialty analyses such as endangered species habitat conservation programs, constraints analyses, biological assessments, and computer-generated visual studies.

We are experienced professionals; the staff works closely on each job and uses subconsultants to add expertise in specific areas, as necessary. A technical team, TRA has been consistently able to deliver large amounts of work, on time, at a reasonable cost. TRA has extensive experience analyzing the component issues of environmental documents. We have considerable background in the environmental review of complex and controversial projects, and have provided the highest level of support to lead agencies in public representation throughout the environmental review process.

We have developed computer-generated graphic techniques that produce superior graphics using the AutoCAD software system. We operate Arc/INFO, the most widely-used geographic information systems (GIS) software, on a Sun workstation providing database and mapping integration for detailed project analysis. Software links allow export and import of information between the AutoCAD and GIS systems. Maps can be produced oversize in color or on slides for public presentations as well as printed in black and white or color for inclusion in reports. The AutoCAD system has been used to prepare visual impact analyses simulating project impacts on a two or three dimensional landscape from the viewpoint of sensitive receptors. AutoCAD and GIS capabilities have also been used to develop alternative project designs, quantify and portray impacts to vegetative communities, illustrate wildlife corridors, depict slope and geographically present the results of noise and air quality models.

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- Source-generated noise levels

Modeling
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- Traffic noise levels
- Roadway barrier attenuation

VISUAL

Viewshed analysis using photo montage and project simulation
Computer-generated terrain modeling with project simulation

WATER QUALITY

Sediment loading
Measurement of dissolved solids

BIOLOGY

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Site evaluations
- Aerial photo interpretation
- Vegetation mapping
- Endangered species surveys
- Habitat enhancement and Wetlands delineation

Habitat conservation planning
- Database mapping of species of concern
- Formulation of plans and funding structures
- Population monitoring programs
- Assistance in preparing 10(a) permits required by the Endangered Species Act

AIR QUALITY

Modeling
Ambient measurements
Monitoring
Impact assessment
BACT requirements
Cumulative basin emissions
Air District Consistency Analyses

Representative Projects

WASTE DISPOSAL
- sanitary landfills
- industrial waste disposal sites
- wastewater treatment programs
- transfer stations/materials recovery
- franchise collection
- green waste composting

INDUSTRIAL AND ENERGY FACILITIES
- oil transshipment and refining
- LNG transshipment/regasification
- oil and gas pipelines
- high-voltage transmission lines
- water supply systems
- processing and warehousing facilities
- cyanide manufacturing
- lumber mills
- steel rolling plants
- research and development laboratories
- bioengineering laboratories
- biomass energy plants
- wind energy facilities
- geothermal energy plants
- waste to energy plants
- coal-fired energy plants
- pet coke-fired energy plants
- tank farms
- communication towers

RESIDENTIAL, COMMERCIAL AND RECREATIONAL DEVELOPMENT
- commercial office buildings
- destination resort complex
- single family housing subdivisions
- multifamily housing subdivisions

RESIDENTIAL, COMMERCIAL AND RECREATIONAL DEVELOPMENT, CONTINUED
- highrise office buildings
- hotel/motel projects
- warehouse/distribution center
- automobile racetrack
- horse racetrack

PLANNING AND REGULATORY ISSUES
- General Plan impact assessment
- LAFCO Sphere of Influence determinations
- land use alternatives analyses
- development constraints analyses
- public health and safety of building materials

RESOURCE MANAGEMENT
- habitat conservation plans (HCP) for endangered species
- land planning guidance studies
- mitigation and monitoring programs
- natural communities conservation planning (NCCP)
- mitigation plans for routine maintenance activities associated with flood control
- range management
- mining reclamation plans
- federal lands disposition

REVEGETATION PLANS
- riparian areas
- interface between natural open space/ residential areas, using habitat species

- planned unit developments
- recreational vehicle park complex
- multi-use trails
- lease renewal of lands for public recreational use

Representative Clients

Local Agencies

City of Alameda
City of Bakersfield
City of Brisbane
City of Calistoga
City of Daly City
City of Dinuba
City of Exeter
City of Farmersville
Town of Hillsborough
City of Lindsay
City of Marina
City of Menlo Park
City of Pacifica
Town of Portola Valley
City of Porterville
City of San Carlos
City of San Jose
City of San Mateo
City of South San
City of Stockton
City of Sunnyvale
City of San Jose
City of Visalia
City of Walnut Creek
City of Woodlake
City of Woodside
City & County of San Francisco
Alameda County
Alameda County LAFCO
Contra Costa County
Grasslands Water District
Kern County
Lake County
Midpeninsula Regional Open Space District
Sacramento County
Sacramento Area Flood Control Agency
San Benito County
San Luis Obispo County
San Mateo County
San Mateo County
Division of Parks and Recreation
Santa Barbara County
Santa Clara County
Santa Clara County Department of Parks and Recreation
Santa Clara Valley Water District
Santa Cruz County
Solano County
Stanislaus County
Stanislaus County LAFCO
Sewer Authority Mid-Coastside (Half Moon Bay)
Tulare County

State Agencies

California Public Utilities Commission
California Water Resources Control Board
California Integrated Waste Management Board
California Energy Commission
California Department of Fish and Game
California Resources Agency
California Department of Parks and
Wisconsin Department of Natural Resources
Oregon Coastal Conservation and
Washington Department of Ecology

Federal Agencies

US Army Corps of Engineers
US Environmental Protection Agency
US Department of Energy
Western Area Power Administration
US Forest Service
US Fish and Wildlife Service
National Park Service

Private and Nonprofit

The Nature Conservancy
Neighborhood associations
Construction trade unions
Food and commodity industry
Bioengineering research and development
Engineers and planners
Land owners and developers
Attorneys
Universities

THOMAS S. REID

Mr. Reid is an environmental impact analyst with emphasis in the physical environment. He has particular expertise in the areas of air and water chemistry, noise assessment, engineering aspects of projects and computer modeling in impact assessment.

Mr. Reid has directed his firm and participated in much of its technical work since its inception in 1972. He has managed the performance of work on over 300 environmental impact assessments and other technical studies, and exerts final quality control over all work leaving the office.

As President of the firm, Mr. Reid is also responsible for the majority of the public representation of its work products. In this capacity, he is especially skilled at communicating in meetings and public hearings. Mr. Reid has a well-earned reputation for excellence of communication in the public forum and for technical input to conflict resolution. He has particular skills in interfacing with project applicants and their engineers, architects, and other professionals to develop a full and accurate description of projects for the purpose of impact evaluation. Mr. Reid is currently employed by the State of California Resources Agency to act as facilitator/coordinator for the HCP and CEQA/NEPA compliance processes for the Headwaters Forest Land Exchange and Sustained Yield Plan. Mr. Reid recently served as the primary facilitator working with the various federal, state and private participants involved in the State's first Natural Communities Conservation Plan for a 6000 square mile area in 6 counties of southern California.

Mr. Reid is well versed in the physical aspects of environmental impact analysis -- air and water quality. His skills include aerial photo interpretation, computerized mapping, and modeling of air and water quality. His skills in air quality impact assessment have kept pace with the steady increase in sophistication in the state-of-the-art analysis demanded by federal and state regulatory agencies. His work in this discipline has earned him the respect of air quality regulatory agencies at different governmental levels, and he has a good working relationship with these agencies.

In addition to his acumen in air and water quality analysis, Mr. Reid conducts on-site noise impact analyses using sound level meters as well as computer-modeling traffic-related noise impacts with noise models recently developed by Caltrans. Mr. Reid personally directs the AutoCAD staff in developing three-dimensional terrain grid models useful in demonstrating impacts to viewshed from the perspective of sensitive receptors and alternative project design possibilities. Mr. Reid has also worked extensively in using AutoCAD to assess other environmental impacts such as loss of vegetative communities, maintenance of wildlife corridors and the graphic depiction of results gained from modeling of air and noise impacts.

One of Mr. Reid's most valuable skills as an environmental professional is his ability to interface with clients, including engineers, to interpret projects in terms of the characteristics that produce their environmental impacts, to define the precise

relationship between the engineering design aspects of projects and their environmental effects, and to suggest design modifications or altered construction techniques that mitigate their adverse effects.

Educational Background and Honors:
B.S. Chemistry, Yale University, New Haven, CT
Graduate study in Biology, Stanford University, Stanford, CA
National Science Foundation graduate fellowship

Professional Societies:
Member, Association of Environmental Professionals
Member, American Chemical Society
Member, Air and Waste Management Association

KAREN G. WEISSMAN, PH.D.

Dr. Weissman has been a principal of Thomas Reid Associates since she completed her doctorate in late 1972, and Vice-President of the firm since 1982. Her areas of expertise include ecology, population biology, demography, land use, governmental planning and policies and regional environmental issues. As a principal of the firm, Dr. Weissman provides public representation of many of her cases in the EIR process. In the firm's numerous cases for the California Public Utilities Commission, she has provided expert witness testimony in administrative law proceedings.

Dr. Weissman has participated in nearly all of the firm's past work, and plays a role in the conceptualization, planning and execution of all jobs. She has served as client liaison for technical information transfer and review on numerous cases, and has expert familiarity with the methods of data collection and analysis from diverse sources, including governmental agencies, universities, public service organizations, public and private interest groups, and private industry and commerce. Dr. Weissman has primary responsibility for administering subcontracts and assuring the delivery of acceptable work products by subcontractors.

Current case work includes the Santa Clara Valley Water District Sediment/Erosion Control and Vegetation Management Program EIRs and the Mount Washington Cellars and Resort Village EIR. Recently completed studies include the Brisbane General Plan EIR, the Pacifica Wastewater Management Plan EIR, and the Grassland Water District Land Planning Guidance Study. Dr. Weissman was Case Manager and Principal Investigator for the Claratina/Coffee and North Beyer Park Reorganization EIR, Gilroy Hot Springs Resort EIR, Gilton Solid Waste Transfer Station and Outdoor Resorts Recreational Vehicle Park EIR. She has also been Principal Investigator for numerous other TRA studies including the Farm Labor Housing Project EIR, Devers-Serrano Transmission Line EIS/EIR.

Dr. Weissman's expertise encompasses up-to-date knowledge of the requirements of CEQA and other environmental legislation and case law as they pertain to environmental documents. She is frequently hired by private and public clients to provide detailed, formal technical review of numerous EIR's prepared by others, including industrial projects, "new towns" other mixed-use developments, high-voltage electrical transmission lines, sewage sludge disposal, and a solid waste/hazardous waste transfer station.

Projects reviewed include the Dougherty Valley General Plan EIR (Contra Costa County), Mountain House new town EIR (San Joaquin County), Diablo Grande and Lakeborough New Town EIRs (Stanislaus County), Renaissance Residential Project EIR (San Jose), Evergreen Specific Plan (San Jose), O'Connell Ranch Annexation/Rezoning (Gilroy), Franklin Canyon residential project (Hercules), Signal Energy Biomass Plant EIR (Shasta County), United Technologies Rocket Motor Facility EIR (Merced County), Metropolitan Oakland International Airport Development Plan EIS/EIR and San Jose International Airport Master Plan Update Draft EIR.

A biologist by training, Dr. Weissman has done biological reconnaissance and impact assessment of projects ranging from oil and gas pipelines, transmission lines, marine terminals for oil and liquid natural gas, port expansion, landfill expansion and residential subdivisions. She has worked closely with wildlife agencies in the study of impacts on rare or endangered species in California and other parts of the western region.

Dr. Weissman has had a central role in the firm's many endangered species conservation planning studies. She was Case Manager for the Southern San Joaquin Valley Habitat Preservation Study (1986-89) and principal author of the Coachella Valley Fringe Toed Lizard Habitat Conservation Plan and EIS/EIR (1984-1985). She provided expertise in theoretical ecology for the Biological Study for Endangered Species and Habitat Conservation Plan for San Bruno Mountain.

Educational Background and Honors

A.B. Zoology, University of California, Los Angeles, *magna cum laude*, with Highest Departmental Honors, elected to Phi Beta Kappa
Ph.D. Biology, Stanford University, Stanford, CA
National Science Foundation Graduate fellowship

Professional Membership

American Association for the Advancement of Science

VICTORIA HARRIS

Ms. Harris, a Senior Associate at Thomas Reid Associates, has been working professionally as an environmental consultant since 1981. Her education and work experience give her particular expertise in the fields of environmental impact analysis, habitat conservation planning for rare and endangered species, biological inventories, and land use analysis.

Since joining TRA in 1981, Ms. Harris has acted as case manager for over 50 Environmental Impact Reports (EIRs) on diverse projects including small and large residential developments, office parks, landfill expansions, quarry operations, general plan amendments, LAFCO reorganizations, and habitat conservation plans. For the above studies she acted as client liaison with the Lead Agency, and researched and prepared the impact analysis sections for the following EIR disciplines: project description, plans and policies, land use, biology, noise, aesthetics, public services, socioeconomics, alternatives, and CEQA issues.

Ms. Harris also has expertise in the preparation of habitat conservation plans (HCP) for endangered species (as allowed under Section 10(a) of the Endangered Species Act). In 1981 she helped prepare the San Bruno Mountain HCP which was the first adopted by the U.S. Department of Interior Fish and Wildlife Service. Since that time, Ms. Harris has participated in the preparation of several additional HCPs (some completed and others in progress) including the Marina Dunes HCP (Smith's blue butterfly), Metropolitan Bakersfield HCP (San Joaquin kit fox and other species), Sand City HCP (Smith's blue butterfly), the Seascape Uplands HCP (Santa Cruz long-toed salamander), Morro Bay HCP (Morro Bay kangaroo rat) and San Benito County HCP (San Joaquin kit fox and other species). Her primary duties for these projects included: case administration, attending task force meetings, coordinating biological studies for the species of concern, and drafting sections of the HCP.

As ongoing technical advisor for planning and habitat management matters relating to the San Bruno Mountain HCP, Ms. Harris is in charge of overseeing the day to day activities of governmental agencies, public utilities, and private developers on the 3,600 acres of endangered species habitat. She also represents San Mateo County to other private and public agencies on matters relating to the particular endangered species or the HCP.

Ms. Harris supervises the activities of several biological field assistants who perform biological inventories, exotic species control, and native plant restoration activities.

Educational Background
B.S. Conservation of Natural Resources, University of California, Berkeley

Professional Licenses
California State Licensed Pest Control Operator

WENDY LIEBER POINSOT

Ms. Poinsot joined Thomas Reid Associates in 1987 and has participated in a wide range of projects as project manager, researcher or contributor to environmental documents and reports. She has worked extensively with geotechnical and hydrologic reports, noise impact assessments, transportation studies, cultural resources investigations and general plans and policy documents as well as in providing response to public input on various projects.

Ms. Poinsot was case manager for the Milagra Terrace SEIR prepared for a revised site plan for a 63-unit residential project in Pacifica. The proposed project generated local controversy centered on visual impacts, geologic hazards to adjacent residences, compatibility with adjacent land uses which included an established residential area and a unit of the National Park Service - Milagra Ridge. The upper slopes of the project were to be deeded to the National Park Service as mitigation for impacts to habitat of the endangered Mission blue butterfly.

Ms. Poinsot was project manager for the preparation of an extensive negative declaration that assessed the impacts of renewing a lease agreement between the Santa Clara Valley Water District and the Santa Clara County Park and Recreation Department for the management of District lands for public recreation. Project description material presented through AutoCAD mapping, aerial photos and text descriptions resulted in the first compilation of those District-wide resources used for public recreation. The CEQA analysis focused on the impacts of recreation to the primary District mandate for the provision of drinking water and secondarily on recreational impacts to District resources. Major issues included endangered species habitat, traffic safety, fire hazard, noise generation and public health and safety.

Ms. Poinsot has contributed sections to numerous environmental documents prepared for residential projects, resorts, quarries, landfills, commercial projects, golf courses and trails. She has also contributed to planning documents including a general plan update, a sphere of influence study and several habitat conservation plans and constraints analyses.

Recently Ms. Poinsot has been contributing to the creation of a comprehensive GIS database that TRA is developing for the Santa Clara Valley Water District. Using Arc/INFO software, District resources were mapped and related to a database of existing channel conditions, habitat type and species occurrence, and records of recent maintenance history. Previously, Ms. Poinsot was responsible for the compilation of a reference and mapping database with over 300 entries that contains reference materials used in developing the State's first Natural Communities Conservation Plan.

Educational Background
B.A. Park History, Colorado State University, Fort Collins
M.A. Geography (*in progress*), Resource Management and Environmental Planning, San Francisco State University, San Francisco

To: Lizanne Reynolds
From: David Marcus David Marcus 9/25/97
Re: Fourmile Hill DEIS/DEIR

I have reviewed the portions of the Fourmile Hill DEIS/DEIR ("the DEIS") dealing with transmission. In sum, it appears that the project's transmission line is sized for a much larger project. My comments are as follows: AG.398

1. Inconsistent Project Descriptions

The DEIS is for a 50 Mw(gross)/45 Mw (net) project, but the Bonneville Power Administration (BPA) report entitled "Calpine's Glass Mountain Geothermal Generation Integration Project Report"[1] describes a "Project" having a "Phase A" capacity of 166 MVA and a delivered capacity of 135-145 Mw. This suggests that Calpine, the Forest Service, and/or others intend or expect a larger generating project to be built than is analyzed in the DEIS. In other words, is there piecemealing going on? AG.399

2. Oversized Transmission Line Capacity

Transmission line capacity is a function of line length, conductor size, number of conductors per phase, conductor material, and voltage. Conductor size is commonly measured in units called thousands of circular mills (MCM, or kcmil). Conductors are commonly made with an aluminum conductor, steel reinforced (ACSR). The proposed transmission line is an 18 mile long 230 KV line using 1272 MCM ACSR conductors (integration report, p. 1), with a resultant line capacity of 300 Mw, more than twice the erstwhile project size of 145 Mw (DEIS; note that the DEIS says that the line would be 24 miles long, not 18; this discrepancy should be explained). Other, smaller, standard conductor sizes are 795 MCM, 954 MCM (see High Desert Power Plant AFC, 6/97, p. 6.4-2, evaluating conductor options for a 230 KV transmission line from a proposed power plant in Southern California), and 1192 MCM (see draft Sutter Power Plant AFC filing, 9/97, Chapter 6, pp. 24-29, comparing the economics of 795, 954, 1192.5 and 1272 kcmil 230 KV transmission lines). Use of a smaller conductor instead of 1272 MCM conductor would result in a smaller line capacity much more in line with the 145 Mw maximum project size. Is the choice of a 1254 MCM conductor another example of piecemealing? Note that a smaller conductor size would reduce AG.400

[1] Ravi K. Aggarwal, BPA, 3/5/96. This report is cited hereafter as the "integration report." All citations are to the executive summary. The balance of the report consists of diagrams and printouts from the load flow studies which underlie BPA's analysis.

capital costs, and, because of reduced conductor weight, might allow less massive and hence less intrusive towers to be built. The DEIS should explain why such a large conductor size is being proposed.

3. Foreseeable Removal of System Constraints

The DEIS says that usable transmission capacity will be limited to only 145 Mw of the 300 Mw line capacity, because of system transmission constraints. The integration report makes clear that those constraints are caused by the potential loss of the Malin-Glass Mountain Tap line section which would be created by the proposed interconnection of Fourmile Hill to the existing Malin-Warner 230 KV line at a new interconnection to be called Glass Mountain Tap (integration report, pp. 4, 5). This suggests that the constraints might be relieved by the construction of a second Glass Mountain Tap-Malin 230 KV line (or by the extension of the proposed Fourmile Hill-Glass Mountain Tap line to go directly from Fourmile Hill to Malin).[2] The distance from the Glass Mountain Tap site to Malin is only 25 miles (integration report, p. 1), all in an existing 230 KV transmission corridor. AG.401

The potential to increase output from the Fourmile Hill area to 300 Mw by building new transmission from Glass Mountain Tap to Malin in an existing corridor suggests, once again, that piecemealing may be going on. It looks like an eventual 300 Mw with about 50 miles of transmission line is being divided into two roughly equal projects, with 145 Mw of generation and 24 miles of transmission (Fourmile Hill-Glass Mountain Tap) being evaluated in this EIS and the next 155 Mw of generation and the remaining 25 miles of transmission (Glass Mountain Tap-Malin) to be evaluated in a future EIS, but with the current transmission line sized to accommodate the future generation and transmission requirements. AG.402

4. Generation Constraints

The DEIS suggests that usable capacity will be limited to only 145 Mw of the 300 Mw line capacity, because system transmission constraints in some hours would require ceasing ("dropping") or reducing ("curtailing") generation at Fourmile Hill if throughput was in excess of 145 Mw. However, the integration report says that, even with Fourmile Hill generation as low as 135 Mw, let alone 145 Mw, dropping of generation at Fourmile Hill will still be necessary under certain contingencies. This raises two separate issues: AG.403

[2] The integration report states, however, that whether new transmission could by used "to relieve overloads or correct voltage problem[s] in lieu of generation reduction will require a detailed study" (integration report, p. 5).

a. Dropping Will Occur at Stated Generation Capacity

If construction of generation is to occur to a level at which generation dropping will be necessary in response to certain transmission contingencies, as the integration report says will occur at the 135 Mw level and above, then the ostensible constraint on generation discussed in the DEIS does not really exist, since the proposed 145 Mw project will already exceed the level of generation which is subject to curtailment or dropping. The project could be constructed to generate up to 300 Mw, subject to interruption for transmission contingencies, without further transmission line construction. In particular, if certain contingencies (such as heavy winter south-to-north flows) occurred at forecastable times, scheduled maintenance on the geothermal project(s) could be scheduled simultaneously with those contingencies, minimizing the "lost" generation potential due to transmission contingencies. Thus, once again, piecemealing of a larger project may be occurring. The DEIS should explain the various scenarios resulting in generation dropping or curtailment and whether they represent true constraints on the level of generation which can be constructed and operated in the Fourmile Hill area.

b. Environmental Impacts of Dropping/Curtailing Fourmile Hill Generation

The integration report calls for dropping and/or reducing Fourmile Hill generation below the 135 Mw level under certain loss-of-transmission contingencies. Such contingencies are generally unanticipated (scheduled transmission line outages for maintenance or repair work do occur, but are infrequent). They are likely to occur during winter storms, summer fires, or other extreme conditions. Repairs may take hours to (in the worst case) days. Even very brief transmission line outages may trip the geothermal generation offline if the tripping scheme is fast-acting. Restoring geothermal generation and resynchronizing geothermal powerplants to the grid will also take hours. The DEIS contains no discussion of the environmental impacts of well emissions during periods of powerplant shutdown, or the expected frequency of transmission line outages which will cause powerplant shutdowns. These reasonably foreseeable impacts should be discussed. AG.404

5. Impacts from delay of the Alturas project

The integration report assumes a 1996 in-service date for Sierra Pacific Power's (SPP's) proposed "Alturas" project, a 164 mile long, 345 KV transmission line and 230/345 KV substation to connect BPA transmission in northeastern California to the SPP system in the Reno, Nevada area. This project will substantially change the transmission grid in the neighborhood of the proposed AG.405

geothermal project.[3] However, the Alturas project has been repeatedly delayed by siting issues north of Reno, and as of August 1997 has not yet begun construction or received all necessary permits, including a California PUC permit (California Energy Markets, 8/29/97, p. 5). The integration report specifically states that its "results could change if the plan of service for the Alturas project was to change" (integration report, p. 2). Thus, the system reliability analysis which the DEIS relies upon may be seriously flawed and its conclusions unreliable. The DEIS should consider any impacts resulting from a delay of the Alturas project.

6. Unresolved Reliability Issues

The integration report contains several caveats. While none of these caveats are grounds per se for not relying upon the integration report in preparation of the DEIS, they do raise substantial questions as to whether the reliability impacts of the project on the regional grid, or the effects of grid contingencies on project operations, have been adequately analyzed. The DEIS appears to neither acknowledge nor resolve the uncertainties created by the incomplete analysis in the integration report. These caveats deal with data inadequacies which should be fixed in a reanalysis of the project's impacts on transmission system reliability. Specific caveats in the integration report include:

a. Mechanically switched capacitors (MSCs) are assumed to be built at Malin as part of the Alturas project, but no final decision to actually build them has been made (integration report, p. 4). Without MSCs, certain transmission contingencies could result in voltage control problems. The integration report itself calls for further studies of voltage control issues (integration report, p. 2, recommendation 2). AG.406

b. A shunt capacitor bank was assumed built at the Warner 230 KV substation to supply voltage support for the Alturas project, but "the final reactive support plan has not been completed" (integration report, p. 2) for the Alturas project. The integration report itself calls for further studies of voltage control issues (integration report, p. 2, recommendation 2).

c. Damper winding data for the geothermal project was deleted from the model because when it was included the model found that the electrical grid was unstable under some contingencies (integration report, p. 3). It is unclear whether

[3] The Fourmile Hill transmission line is proposed to interconnect with the existing Malin-Warner 230 KV line. The Alturas project is proposed to interconnect with the same line, at a new 230/345 KV substation to be called Hilltop, to be built between the proposed Glass Mountain Tap and the existing Warner substation. See integration report, Figure 1.

the problem is bad data or whether the project would indeed cause unstable system responses to some contingencies. The integration report itself calls for any further analysis to include correct damper winding data (integration report, p. 2, recommendation 3).

7. Alternate Transmission Paths

The DEIS rejects without further analysis alternative transmission paths including direct connection northward to Malin or Captain Jack substations, asserting that such lines "would need to cross through or in close proximity to the Lava Beds National Monument" and "could cross the Tule Lake and Lower Klamath Wildlife Refuges" and "could" affect views and air quality (during construction) in the Monument (DEIS, p. 2-71). These statements are disingenuous at best. A northward line would not need to cross either the National Monument or either of the Wildlife Refuges. There is no analysis in the DEIS as to how likely it is that routes northward of the proposed project would have (as opposed to "could" have) any visual or air quality impact whatsoever on the Monument. The paragraph in the DEIS (p. 71) stating that a transmission line through the wildlife refuges would have adverse impacts on wetlands, wildlife, and recreation, while arguably true, is completely irrelevant since a northward line need not cross one inch of either Wildlife Refuge (Forest Service map, Modoc National Forest). It appears these alternatives were unreasonably rejected. The DEIS should provide more information addressing northward transmission alternatives. AG.407

8. Failure to Consider Connecting With Existing 115 KV lines

The DEIS describes the proposed 230 KV transmission line as having a 300 Mw capacity, of which only 45 Mw would be directly used by the Fourmile Hill project and no more than 145 Mw would be usable in total because of regional transmission constraints. However, the DEIS does not appear to have considered the alternative of using 115 KV transmission to deliver project output to the regional grid. A single or double-circuit 115 KV line would have less than 300 Mw of capacity, but unless piecemealing is taking place, that would not matter since no more than 145 Mw of transfer capability is needed even considering the cumulative impacts of associated projects.[4] AG.408

The DEIS rejects the idea of building a 230 KV line to interconnect with existing 115 KV lines because of the associated transformer expense (DEIS, p. 2-

[4] The Cushman Hydroelectric Project in Washington is an example of a project which uses 115 KV lines to deliver project output. There, the output of 131 Mw of installed hydro capacity is delivered over two 115 KV lines for a distance of 26.8 miles (FERC, FEIS for Cushman Hydroelectric Project, 11/96, p. xv.

71), but ignores the possibility of building a 115 KV line to interconnect with existing 115 KV lines. There is no discussion of the location, feasibility or cost of interconnecting with 115 KV lines to the east, south, or north of the project. There is a discussion of the location (50 miles) of 115 KV lines to the west, but no discussion of the feasibility or cost of interconnecting with those lines by means of a 115 KV line from the project.

9. Failure to Consider Use of 115 KV Lines in the Proposed Transmission Corridor

The DEIS ignores the possibility of using the proposed transmission corridor but using 115 KV transmission instead of 230 KV transmission. Use of 115 KV transmission to deliver project output would save money at the project site (by requiring only a 13.8/115 KV step-up transformer instead of the proposed 13.8/230 KV step-up transformer), and it would save money and reduce environmental impacts along the transmission right-of-way (by reducing construction costs and the width of the required right-of-way). The DEIS estimates that 500 KV transmission lines are two to five times as expensive to build as 230 KV lines (DEIS, p. 2-72). It does not state whether 230 KV transmission lines are in turn two to five times as expensive to build as 115 KV transmission lines. AG.409

The DEIS does not identify what, if any, 115 KV transmission lines are located east of the proposed powerplant(s). In the worst case, even if there is no usable existing 115 KV line at or near the transmission corridors studied in the DEIS, a 115 KV line east from Fourmile Hill could still interconnect with the existing 230 KV Malin-Warner line. Doing so would require a 115/230 KV substation at or near the Glass Mountain Tap site that would not be required for the project as proposed, but it is unclear whether the cost of that substation would outweigh the savings from reduced line and transformer costs up to that point. Even if such an interconnection would be more expensive than the proposed interconnection, the DEIS still fails to analyze what environmental benefits might result (e.g., from reduced visual and construction impacts associated with a narrower right-of-way and reduced tower height for a lower voltage line).

10. Failure to Consider Reliability and Environmental Costs of the Proposed Single-Circuit Transmission Line From the Project

The DEIS fails to identify the reliability and environmental benefits which could result from the use of a double-circuit rather than single circuit transmission line to deliver Fourmile Hill generator output. With the proposed transmission system, any outage of the 24-mile Fourmile Hill-Glass Mountain Tap line will require complete shutdown of all geothermal generation connected to that line. The outage would continue until the transmission line was back in service, since (according to the DEIS), "backfeeding" over the transmission line is the planned source of on-site power for the project. During the shutdown, project owners will AG.410

suffer economic losses from lack of any market for their generation and, apparently, net emissions to the atmosphere will increase.

If a double circuit transmission system were built instead, an outage to one circuit would still allow some or all generation to flow over the remaining circuit, avoiding a complete shutdown, and the remaining circuit would provide onsite power to the project.

A double circuit transmission system would also allow phasing of the project. For example, a single 115 KV transmission circuit would be adequate to transmit the initial 50 Mw of Fourmile Hill generation, even if a second circuit would be needed later if the full 145 Mw were developed.

RESUME

DAVID I. MARCUS
P.O. Box 358
Berkeley, CA 94701-0358

March, 1997

Employment

Self-employed, March 1981 - Present

Consultant on energy and electricity issues. Clients have included Imperial Irrigation District, the cities of Albuquerque and Boulder, the Rural Electrification Administration (REA), BPA, the Attorney General of California, alternative energy and cogeneration developers, environmental groups, labor unions, other energy consultants, and the Navajo Nation. Projects have included economic analyses of utility resource options and power contracts, utility restructuring, utility bankruptcy, nuclear power plants, non-utility cogeneration plants, and offshore oil and hydroelectric projects. Experienced user of production cost models to evaluate utility economics. Very familiar with western U.S. grid (WSCC) electric resources and transmission systems and their operation and economics. Have also performed EIS reviews, need analyses of proposed coal and hydro powerplants, transmission lines, and coal mines. Have presented expert testimony before the California Energy Commission, the Public Utility Commissions of California, New Mexico, and Colorado, the Interstate Commerce Commission, and the U.S. Congress. The attached client list describes in greater detail projects worked on as a consultant.

Environmental Defense Fund (EDF), October 1983 - April 1985

Economic analyst, employed half time at EDF's Berkeley, CA office. Analyzed nuclear power plant economics and coal plant sulfur emissions in New York state, using ELFIN model. Wrote critique of Federal coal leasing proposals for New Mexico and analysis of southwest U.S. markets for proposed New Mexico coal-fired power plants.

California Energy Commission (CEC), January 1980 - February 1981

Advisor to Commissioner. Wrote "California Electricity Needs," Chapter 1 of Electricity Tomorrow, part of the CEC's 1980 Biennial Report. Testified before California PUC and coauthored CEC staff brief on alternatives to the proposed 2500 megawatt Allen-Warner Valley coal project.

CEC, October 1977 - December 1979

Worked for CEC's Policy and Program Evaluation Office. Analyzed supply- side alternatives to the proposed Sundesert nuclear power plant and the proposed Point Concepcion LNG terminal. Was the CEC's technical expert in PG&E et. al. vs. CEC lawsuit, in which the U.S. Supreme Court ultimately upheld the CEC's authority to regulate nuclear powerplant siting.

Energy and Resources Group, U.C. Berkeley, Summer 1976

Developed a computer program to estimate the number of fatalities in the first month after a major meltdown accident at a nuclear power plant.

Federal Energy Agency (FEA), April- May 1976

Consultant on North Slope Crude. Where To? How?, a study by FEA's San Francisco office on the disposition of Alaskan oil.

Angeles Chapter, Sierra Club, September 1974 - August 1975

Reviewed EIRs and EISs. Chaired EIR Subcommittee of the Conservation Committee of the Angeles Chapter, January - August 1975.

Bechtel Power Corporation (BPC), June 1973 - April 1974

Planning and Scheduling Engineer at BPC's Norwalk, California office. Worked on construction planning for the Vogtle nuclear power plant (in Georgia).

Education

Energy and Resources Group, U.C. Berkeley, 1975 - 1977

M.A. in Energy and Resources. Two year master's degree program, with course work ranging from economics to engineering, law to public policy. Master's thesis on the causes of the 1972-77 boom in the price of yellowcake (uranium ore). Fully supported by scholarship from National Science Foundation.

University of California, San Diego, 1969 - 1973

B.A. in Mathematics. Graduated with honors. Junior year abroad at Trinity College, Dublin, Ireland.

Professional Publications

"Rate Making for Sales of Power to Public Utilities," with Michael D. Yokell, in Public Utilities Fortnightly, August 2, 1984.

David Marcus
P.O. Box 358
Berkeley, CA
94701 - 0358

August, 1997

CLIENT LIST

1. IBEW Local 18 (1996-present)

   Analysis of consequences of restructuring for LADWP. Reviewed strategic planning documents and other LADWP plans for dealing with stranded assets. Met with City of Los Angeles City Council members and with LADWP senior management to discuss conclusions.

2. Coalition of California Utility Employees (CCUE) (1994-present)

   Active participation in restructuring of utility regulation in California to allow retail wheeling. Testimony in both statewide restructuring proceedings and SCE proceedings on performance-based ratemaking (PBR) and plant divestiture. Assistance in FERC proceedings to create a California ISO and PX. Active reviewer and commenter on must-run contract proposals by PG&E, SCE, and the ISO trustee.

3. Confidential client (1997)

   Analysis of future conditions in Eastern U.S. electricity markets. Reviewed numerous existing power purchase contracts on behalf of a large electric utility interested in acquiring the generation assets of another large electric utility. Also evaluated the value of certain transmission rights. Helped establish a price to be bid for the desired assets, and presented results to the senior management of the client utility.

4. Trout Unlimited (1997)

   Analysis of hydro projects in the Kennebec River basin, Maine.

5. Hydropower Reform Coalition (HRC)(1996-1997)

   Written report on FERC economic analyses in hydro proceedings since the Mead decision in mid-1995. Written report on implications of electric industry restructuring for hydro licensing. Presentations of results to HRC and to FERC staff.

6. Goodin, MacBride, Squeri, Schlotz & Ritchie (1996)

Litigation support in multi-million dollar administrative proceeding.

7. Lempres & Wulfsberg (1996)

Litigation support in civil proceeding involving electric utility rate design.

8. Confidential client, Colorado (1996)

Analysis of various issues involving QFs in Colorado.

9. American Atlas, et.al. (1996)

Testified in Colorado PUC Docket 94I-264E regarding operation of Public Service Company of Colorado's Pawnee coal plant and PSCo's dispatch of large, dispatchable Qualifying Facilities (QFs) in its service area.

10. Friends of the Trinity River (1995-1996)

Analysis of environmental documents regarding management of dams which divert water from the Trinity to Sacramento Rivers in Northern California.

11. Platte River Whooping Crane Trust (1994-1996)

Assisted Trust on relicensing of hydro projects on the Platte River.

12. Tuolomne River Preservation Trust (1992-1995)

Analyzed economics of proposed Clavey River hydro project. Testified before Turlock Irrigation District Board of Directors on TID's need for Clavey and alternatives to it. Prepared written comments for submission to FERC in licensing proceeding.

13. Bonneville Power Administration (1992-1995)

Analyzed California and Southwest power markets and their relationship with changing system operations in the Pacific Northwest due to fish protection efforts.

14. Natural Resources Defense Council (NRDC) (1994)

Evaluated costs to Pacific Northwest of proposed drawdowns of Snake River reservoirs. Wrote report quantifying dollar impacts to power system, farmers, and others of drawdown strategies.

15. Calpine Corporation (1994)

Provided detailed data on PG&E system operations in 1987-93.

16. Kenetech Corporation (1994)

Ran ELFIN production cost model of PG&E system to forecast future marginal costs with different natural gas price forecasts.

17. Grand Canyon Trust (GCT) (1994)

Prepared written comments on Western Area Power Administration (WAPA) draft marketing EIS.

18. GCT and American Rivers (AR) (1994)

Prepared written comments on Bureau of Reclamation's draft EIS on Glen Canyon Dam operations and their impacts on the Grand Canyon. Evaluated retail rate impacts of proposed changes in dam operations.

19. Henwood Energy Systems, Inc. (HESI) (1994)

Provided detailed data on PG&E system operations in 1989-93.

20. Colorado Independent Energy Association (1993-1994)

Analyzed filings by PSCo in Colorado's Integrated Resource Planning (IRP) proceeding. Performed detailed review of Proscreen and Prosym generation expansion and dispatch modelling. Prepared and delivered expert testimony. Assisted in cross-examination of PSCo rebuttal witnesses and preparation of brief.

21. RCG/Hagler, Bailly, Inc. (1993)

For San Diego Gas & Electric, a utility client of RCG, assisted in ELFIN modelling of the system impacts of bids received in response to a supply-side RFP.

22. Folger & Levin (1993)

Provided litigation support in a lawsuit brought by US Windpower against PG&E over contract implementation. Analyzed PG&E system operations under low load conditions, 1986-93. Testified as an expert witness at jury trial. Jury awarded US Windpower $17 million for PG&E's contract violations.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

June 17, 1997

Mr. Patrick Griffin
Siskiyou County Air Pollution Control District
525 South Foothill Drive
Yreka, California 96097-3090

Mr. Randall Sharp
US Forest Service/Bureau of Land Management
Telephone Flat Geothermal Development
Project EIS/EIR Coordinator
800 West 12th Street
Alturas, California 96101

Dear Messrs. Griffin and Sharp:

Notice of Preparation for a Draft Environmental Impact Report for the Telephone Flat Geothermal Development Project (TFGP) (SCH# 97052078)

The California Department of Fish and Game (Department) has reviewed the subject notice of preparation. California Energy General Corporation (CalEnergy) proposes to construct a 48-megawatt dual flash geothermal power plant with associated geothermal production and injection wells, well pads, roads, interconnected geothermal fluid pipelines and a 21-mile, 230-kilovolt (kV) transmission line. This project involves the production of geothermal fluids from 10 to 20 two-phase production wells located at up to 22 alternative production well pad sites. Steam produced from these sites would be transported via four miles of surface pipeline to the power plant. Well pad area would occupy 81 to 121 acres. The power plant site would be approximately 18.5 acres. One mile of new road and 16 miles of surface improvement or reconstructed road is proposed for this project. The transmission line would extend from the power plant to connect to the Bonneville Power Administration line between Perez and Flukey wells. This project is located within the Glass Mountain Known Geothermal Resource Area (KGRA) in Modoc and Siskiyou counties.

The Department reviewed and commented on earlier stages of this ongoing project known as the Glass Mountain Unit Geothermal Exploration Project Environmental Assessment/Initial Study (SCH #95041056) in our May 24, 1995, letter to Mr. Griffin. That initial study concerned the construction of exploratory geothermal temperature core hole wells and complete test deep exploration wells.

Calpine Corporation has proposed a very similar project known as the Fourmile Hill Geothermal Development Project (FHGP) adjacent to the proposed TFGP. The Department commented on that project in a July 9, 1996, letter to Mr. Randall Sharp. Those comments also pertain to the TFGP. A copy of that letter is included for your reference.

The Department is concerned about the lack of hydrologic data and the effect of surface or ground water use on water quality and fish and wildlife resources. In a January 31, 1997, preproposal submitted by Messrs. M. Lee Davisson, T.L. Trowbridge Grose and T.P. Rose regarding the Isotope Hydrology and Geologic Mapping of the Medicine Lake Volcanic Highlands (MLVH), concerns about the effects of developing geothermal resources in the MLVH on the Fall River Springs (FRS) recharge were stated. Their evidence suggests that MLVH has a dominant effect on recharging the FRS, which constitutes 18 percent of the average annual flow into Shasta Reservoir. This report also states that the FRS contains habitat for several Federal and State-listed endangered and threatened species. The cumulative effects of both geothermal projects on the water table for surrounding springs, Bullseye, Blanche and Medicine lakes are not addressed. Cumulative impacts to the water table during low rainfall years were also not evaluated. No further work on either geothermal project should commence without addressing these issues. Ongoing monitoring of ground water quality and quantity following operation of both power plants should be implemented with detailed guidelines that address contingency measures if ground water levels are threatened.

The proposed power plants for the FHGP and the nearly identical TFGP are only five miles apart. Given that they are both contained within the Glass Mountain KGRA, the full environmental impacts of these combined projects should be evaluated together. Evaluating each individual project alone does not adequately address the cumulative loss of water recharge capability, habitat loss and other environmental impacts.

For example, the TFGP states that if the FHGP is constructed prior to the TFGP, and *if* they build their alternative transmission line (as opposed to their preferred route), then the amount of transmission line would be shorter (1.5 miles) as it would tie into the Fourmile Hill transmission line. Thus, if the FHGP does not build the alternate line, the total transmission line for the TFGP would be 21 miles and the FHGP would have a 24-mile transmission line. The Department recommends that efforts be made to reduce the amount of transmission line to reduce habitat loss and impacts to raptors.

Combined impacts to wildlife and proposed mitigation measures of both projects should be detailed and evaluated together. For example, the EIR should address cumulative impacts of above ground pipelines to wildlife migration routes, noise from both power plants on wildlife, and the cumulative hydrologic effect on ground water.

We recommend that the DEIR incorporate standards for retention of dead and down woody debris and snags. It should include details on plant and wildlife survey methods and results, the impact to the significant natural area (Modoc 015 Flukey Well) occurring near the proposed power line and the other issues raised in our previous response concerning the FHGP.

Thank you for your consideration of these comments. If you have any questions regarding our comments, please contact staff biologist Ms. Terri Weist at (916) 459-1129.

Sincerely,

for Richard L. Elliott
Regional Manager

Enclosure

cc: Ms. Terri Weist
Department of Fish and Game
1724 Ball Mountain Road
Montague, California 96064

STATE OF CALIFORNIA—THE RESOURCES AGENCY
PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

May 24, 1995

Mr. Patrick J. Griffin
Siskiyou County Air Pollution Control District
525 South Foothill Drive
Yreka, California 96097

Dear Mr. Griffin:

Glass Mountain Unit Geothermal Exploration Project
Environmental Assessment/Initial Study
SCH 95041056

The California Department of Fish and Game has reviewed the Glass Mountain Unit Geothermal Exploration Project environmental assessment/initial study, the draft decision record and draft finding of no significant impact for the project. The California Energy General Corporation (CEGC) proposes to implement a plan of operation (Plan) for exploratory geothermal drilling with the Glass Mountain Know Geothermal Resource Area (KGRA) located in the Medicine Lake Highlands on the Modoc and Shasta-Trinity national forests in Siskiyou County. In the proposed Plan, CEGC proposes to drill five exploratory geothermal temperature core hole (TCH) wells; drill, complete and test deep (production size) exploration wells at five well pads within the Glass Mountain KGRA.

The project proposes to construct approximately 2,600 feet of new access roads and improvement to 8,150 feet of existing access roads. Total surface disturbance is estimated to be 29.6 acres. To minimize the increase in road density in the Glass Mountain area and reduce harassment to wildlife, newly constructed or improved roads should be permanently gated to prevent vehicle entry. These gates should be closed and locked when construction or drilling activities are not taking place. These roads should also remain closed during hunting seasons. Permanently locked gates will also facilitate successful revegetation efforts of abandoned access roads.

The environmental assessment's (EA) reclamation section states that if wells are found to be nonproductive, wells will be abandoned and well pads and access roads will be restored to their preproject condition. Objectives and success criteria should be developed to gauge successful revegetation of the sites. Revegetation can be considered successful when the sites have revegetated at a level of eighty percent of the adjacent ground cover within five years. If natural revegetation of the well pad sites and access roads are not meeting the performance standards, the project proponents should actively revegetate these areas with local native seed stock. This can include planting lodgepole pine, red fir and other tree species that are listed in Table 3.5-1 of the EA. A revegetation plan should be submitted with details on site preparation, performance standards, monitoring methods and reporting schedule. If site data

Mr. Patrick J. Griffin
May 24, 1995
Page Two

containing information on revegetation rates exists on comparable drilling well sites occurring in the Glass Mountain KGRA, that data should be made available to analyze the potential for successful revegetation efforts for this proposed project.

TCH drilling operations will require approximately 3,000 to 5,000 gallons of water per day for 25-60 days. Exploratory wells require up to 9,000 gallons per day for 60-90 days of operation. Up to 40,000 gallons could be required in lost circulation zones. Water for drilling operations will be extracted from two wells at Arnica Sink and possibly Harris Springs and Pumice Stone wells. Water can be a limited resource in this area and wildlife in the area depend upon dispersed available water sources. The EA claims that geothermal drilling would not significantly deplete water resources in the vicinity. The US Geological Survey is proposing to assume hydrologic monitoring responsibilities for the Glass Mountain area and has prepared a draft hydrologic monitoring plan that identifies a proposed monitoring program. Since this hydrologic monitoring plan is only in the draft stage, this EA should provide a specific monitoring plan that will be implemented to ensure that water resources in the Glass Mountain KGRA are not significantly affected by the proposed activities.

To prevent possible injury to deer and other animals, plastic fencing has been proposed to prevent access by wildlife into the well pad areas. This may be ineffective at keeping other wildlife from entering the sumps. Birds and small mammals could potentially be attracted to the sumps and become trapped. The project proponent should provide some alternatives that could be implemented if this problem occurs.

Thank you for your consideration of these comments. If you have any questions regarding our review of this project, please contact our staff biologist Ms. Terri Weist at (916) 938-1169.

Sincerely,

Randal C. Berthiaume

Richard L. Elliott
Regional Manager

cc: See attached list

Mr. Patrick J. Griffin
May 24, 1995
Page Three

cc: Ms. Terri Weist
Department of Fish and Game
1724 Ball Mountain Road
Montague, California 96064

Mr. Rich Burns
Bureau of Land Management
Susanville District, Alturas Resource Area
708 West 12th Street
Alturas, California 96101

Mr. Bernie Weisgerber
US Forest Service
Modoc National Forest
800 West 12th Street
Alturas, California 96101

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
3310 El Camino Ave., Suite 130
Sacramento, California 95821-6340

In Reply Refer To:
PPN 2140

RECEIVED
JUL 5 1996

July 3, 1996

Patrick Griffin
Siskiyou County APCD
525 South Foothill Drive
Yreka, California 96097-3090

Subject: Fourmile Hill Geothermal Development Project, Modoc and Siskiyou Counties, California

Dear Mr. Griffin:

The U.S. Fish and Wildlife Service has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Fourmile Hill Geothermal Development Project. These comments are intended to assist you in your review of the proposal, and will not take the place of any formal comments that may be required under the provisions of the Fish and Wildlife Coordination Act.

Enclosure A provides a list of sensitive species that may occur in the county of the project area, and general survey guidelines. Enclosure B recommends general guidelines for identifying and mitigating project impacts to fish, wildlife, and their habitats. We encourage you to use these guidelines to develop a comprehensive environmental document that addresses these needs.

If you have any questions regarding these comments, please contact Jason Davis (Wetlands Branch) at (916) 979-2113.

Sincerely,

for Joel A. Medlin
Field Supervisor

Enclosures

cc: AES-Portland, OR
FWS-ES, Section 7
Reg. Mgr., CDFG, Reg. I, Redding
(without enclosures)

ENCLOSURE A

Endangered Species. This attachment identifies those listed, proposed, and/or candidate species that may occur in the proposed project area. Information and maps concerning candidate species in California may be obtained from the California Natural Diversity Data Base, a program administered by the California Department of Fish and Game. Requests for information should be addressed to the Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814. The marketing manager may be contacted by calling (916) 324-0562. You may request additional information from the Chief, California Department of Fish and Game, Non-Game Heritage Program, at (916) 324-8348.

Listed species are fully protected under the mandates of the Endangered Species Act (Act), as amended. Section 9 of the Act and its implementing regulations prohibit the "take" of a federally listed fish and wildlife species by any person, as defined by the Act. Take is defined by the Act "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR § 17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency is involved with the permitting, funding, or carrying out of this project, initiation of formal consultation is required between that agency and the Service pursuant to section 7 of the Act if it is determined that the proposed project may affect a federally listed species. Federal agencies must confer if they determine that the continued existence of a proposed species may be jeopardized by the project. Such consultation or conference could result in a biological opinion that addresses anticipated effects of the project to listed and proposed species. The biological opinion may authorize a limited level of incidental take for federally listed species.

If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an "incidental take" permit pursuant to section 10(a) of the Act should be obtained. The Service may issue such a permit upon completion by the permit applicant of a satisfactory conservation plan for the listed species that may be affected by the project.

We recommend that appropriately designed surveys for listed, proposed, or candidate species be undertaken by qualified biologists. Surveys for plants should not be restricted to the identified species; instead, a complete botanical inventory of the project site should be conducted. Botanical surveys should be conducted at intervals throughout the spring and summer, in order to maximize the likelihood of encountering each species during the season most appropriate for accurate identification. Surveys should be based on field inspection, and not on prediction of occurrence based on habitat or physical features of the site. Guidelines for conducting adequate botanical surveys are available from the Natural Heritage Division of the California Department of Fish and Game at (916) 322-2493.

The results of all biological surveys should be published in the environmental impact report. The report should include a brief discussion of survey methods (including sampling methods and timing of surveys), results (including a list of all species encountered as well as maps of vegetation types, populations of plant species, and breeding, nesting or burrowing sites or other habitat components important to animal species), and conclusions. If it is concluded that a given sensitive species is not present, the justification for this conclusion should be fully explained.

Should these surveys determine that listed, proposed, or candidate species may be affected by the proposed project, the Service recommends that the project proponent, in consultation with this office and the California Department of

Fish and Game, develop a plan that mitigates for the project's direct and indirect impacts to these species and compensates for project-related loss of habitat. The mitigation plan also should be included in the environmental impact report.

One of the benefits of considering candidate species as well as listed and proposed species early in the planning process is that by exploring alternatives, it may be possible to avoid conflicts that could develop, should a candidate species become listed before the project is complete. In addition, in instances where the Service addresses proposed projects under its Fish and Wildlife Coordination Act authority, we must also analyze the impacts on candidate species and make recommendations to mitigate any adverse effects.

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN OR BE AFFECTED BY PROJECTS IN THE AREA OF MODOC COUNTY, CALIFORNIA
June 21, 1996

Listed Species

Birds

American peregrine falcon, *Falco peregrinus anatum* (E)
bald eagle, *Haliaeetus leucocephalus* (T)
northern spotted owl, *Strix occidentalis caurina* (T)

Fish

Modoc sucker, *Catostomus microps* (E)
Modoc sucker critical habitat, *Catostomus microps* (E)
shortnose sucker, *Chasmistes brevirostris* (E)
shortnose sucker proposed critical habit, *Chasmistes brevirostris* (E)
Lost River sucker, *Deltistes luxatus* (E)
Lost River sucker proposed critical hab, *Deltistes luxatus* (E)
Warner sucker, *Catostomus warnerensis* (T)
delta smelt, *Hypomesus transpacificus* (T)

Invertebrates

Shasta crayfish, *Pacifastacus fortis* (E)

Proposed Species

Fish

Klamath Mts: Province steelhead, *Oncorhynchus mykiss* (PT)
Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

Candidate Species

Amphibians

spotted frog, *Rana pretiosa* (C)

Fish

Cowhead Lake tui chub, *Gila bicolor vaccaceps* (C)

Species of Concern

Mammals

pygmy rabbit, *Brachylagus idahoensis* (SC)
spotted bat, *Euderma maculatum* (SC)
California wolverine, *Gulo gulo luteus* (SC)
Sierra Nevada snowshoe hare, *Lepus americanus tahoensis* (SC)
Pacific fisher, *Martes pennanti pacifica* (SC)
small-footed myotis bat, *Myotis ciliolabrum* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
California bighorn sheep, *Ovis canadensis californiana* (SC)
Pale Townsend's big-eared bat, *Plecotus townsendi pallescens* (SC)
Sierra Nevada red fox, *Vulpes vulpes necator* (SC)

Birds

northern goshawk, *Accipiter gentilis* (SC)
tricolored blackbird, *Agelaius tricolor* (SC)
western burrowing owl, *Athene cunicularia hypugea* (SC)
ferruginous hawk, *Buteo regalis* (SC)
little willow flycatcher, *Empidonax traillii brewsteri* (SC)
white-faced ibis, *Plegadis chihi* (SC)
Columbian sharp-tailed grouse, *Tympanuchus phasianellus columbianus* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
Northern sagebrush lizard, *Sceloporus graciosus graciosus* (SC)

Species of Concern

Fish

Goose Lake sucker, *Catostomus occidentalis* (SC)
Klamath largescale sucker, *Catostomus snyderi* (SC)
rough sculpin, *Cottus asperrimus* (SC)
Goose Lake lamprey, *Lampetra tridentata ssp.* (SC)
Pit Roach, *Lavinia symetricus mitrulus* (SC)
Warner Valley redband trout, *Oncorhynchus (=Salmo) mykiss ssp* (SC)
Goose Lake redband trout, *Oncorhynchus (=Salmo) mykiss ssp.* (SC)

Invertebrates

Siskiyou ground beetle, *Nebria gebleri siskiyouensis* (SC)
Trinity Alps ground beetle, *Nebria sahlbergii triad* (SC)

Plants

Greene's mariposa, *Calochortus greenei* (SC)
long-haired star-tulip, *Calochortus longebarbatus var. longebarbatus* (SC)
prostrate buckwheat, *Eriogonum prociduum* (SC)
Egg Lake monkeyflower, *Mimulus pygmaeus* (SC)
Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)
Devil's Garden pogogyne, *Pogogyne floribunda* (SC)
Columbia yellow-cress, *Rorippa columbiae* (SC)
scalloped moonwort, *Botrychium crenulatum* (SC)

Notes:

(E)	*Endangered*	Species that is in danger of extinction throughout all or a significant portion of its range.
(T)	*Threatened*	Species that is likely to become endangered within the foreseeable future.
(P)	*Proposed*	Species that has been proposed in the *Federal Register* to be listed as endangered or threatened.
(CH)	*Critical Habitat*	Area essential to the conservation of a species.
(C)	*Candidate*	Species for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.
(SC)	*Species of Concern*	Species for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.
(CR)	Recommended for candidate status.	
( )	Listing petitioned.	
(*)	Possibly extinct.	

Listed Species

Birds

American peregrine falcon, *Falco peregrinus anatum* (E)
marbled murrelet, *Brachyramphus marmoratus* (T)
bald eagle, *Haliaeetus leucocephalus* (T)
northern spotted owl, *Strix occidentalis caurina* (T)
northern spotted owl critical habitat, *Strix occidentalis caurina* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

shortnose sucker, *Chasmistes brevirostris* (E)
shortnose sucker proposed critical habit, *Chasmistes brevirostris* (E)
Lost River sucker, *Deltistes luxatus* (E)
Lost River sucker proposed critical hab, *Deltistes luxatus* (E)
winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
delta smelt, *Hypomesus transpacificus* (T)

Invertebrates

Shasta crayfish, *Pacifastacus fortis* (E)

Proposed Species

Fish

Coho salmon, *Oncorhynchus kisutch* (PT)
Klamath Mts. Province steelhead, *Oncorhynchus mykiss* (PT)
Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

Plants

slender Orcutt grass, *Orcuttia tenuis* (PT)

Candidate Species

Plants

Yreka phlox, *Phlox hirsuta* (C)

Species of Concern

Mammals

California red tree vole, *Arborimus pomo* (SC)
spotted bat, *Euderma maculatum* (SC)
California wolverine, *Gulo gulo luteus* (SC)
Sierra Nevada snowshoe hare, *Lepus americanus tahoensis* (SC)
Pacific fisher, *Martes pennanti pacifica* (SC)
small-footed myotis bat, *Myotis ciliolabrum* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
Pale Townsend's big-eared bat, *Plecotus townsendi pallescens* (SC)
Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)
Sierra Nevada red fox, *Vulpes vulpes necator* (SC)

Birds

northern goshawk, *Accipiter gentilis* (SC)
tricolored blackbird, *Agelaius tricolor* (SC)
western burrowing owl, *Athene cunicularia hypugea* (SC)
ferruginous hawk, *Buteo regalis* (SC)
little willow flycatcher, *Empidonax traillii brewsteri* (SC)
white-faced ibis, *Plegadis chihi* (SC)
California spotted owl, *Strix occidentalis occidentalis* (SC)

Species of Concern

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

tailed frog, *Ascaphus truei* (SC)
Del Norte salamander, *Plethodon elongatus* (SC)
Siskiyou Mountains salamander, *Plethodon stormi (=elongatus s.)* (SC)
foothill yellow-legged frog, *Rana boylii* (SC)
Cascades frog, *Rana cascadae* (SC)
southern torrent (seep) salamander, *Rhyacotriton variegatus (=olympicus)* (SC)

Fish

green sturgeon, *Acipenser medirostris* (SC)
Jenny Creek sucker, *Catostomus rimiculus ssp.* (SC)
Klamath largescale sucker, *Catostomus snyderi* (SC)
rough sculpin, *Cottus asperrimus* (SC)
river lamprey, *Lampetra ayresi* (SC)
Pit Roach, *Lavinia symetricus mitrulus* (SC)
longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Franklin's bumblebee, *Bombus franklini* (SC)
confusion caddisfly, *Cryptochia shasta* (SC)
Leech's skyline diving beetle, *Hydroporous leechi* (SC)
Siskiyou ground beetle, *Nebria gebleri siskiyouensis* (SC)
Trinity Alps ground beetle, *Nebria sahlbergii triad* (SC)
Siskiyou caddisfly, *Neothremma siskiyou* (SC)
Castle Crags rhyacophilan caddisfly, *Rhyacophila lineata* (SC)
ground beetle (no common name), *Scaphinotus bahrensi* (SC)
Karok hesperian (=Indian) snail, *Vespericola karokorum* (SC)

Plants

Preston Peak rock-cress, *Arabis serpentinicola* (SC)
Klamath manzanita, *Arctostaphylos klamathensis* (SC)
Greene's mariposa, *Calochortus greenei* (SC)
long-haired star-tulip, *Calochortus longebarbatus var. longebarbatus* (SC)
Siskiyou mariposa, *Calochortus persistens* (SC)
Wilkins' harebell, *Campanula wilkinsiana* (SC)
pallid bird's-beak, *Cordylanthus tenuis ssp. pallescens* (SC)
clustered lady's-slipper, *Cypripedium fasciculatum* (SC)
Mt. Eddy draba, *Draba carnosula* (SC)
Oregon fireweed, *Epilobium oreganum* (SC)
Trinity buckwheat, *Eriogonum alpinum* (SC)
Mendocino gentian, *Gentiana plurisetosa* (SC)
Henderson's horkelia, *Horkelia hendersonii* (SC)
Pickering's ivesia, *Ivesia pickeringii* (SC)
Heckner's lewisia, *Lewisia cotyledon var. heckneri* (SC)
Howell's lewisia, *Lewisia cotyledon var. howellii* (SC)
Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)
Cooke's phacelia, *Phacelia cookei* (SC)
Trinity (Scott Mountain) phacelia, *Phacelia dalesiana* (SC)
Scott Valley phacelia, *Phacelia greenei* (SC)
showy raillardella, *Raillardella pringlei* (SC)

Species of Concern

Plants

Columbia yellow-cress, *Rorippa columbiae* (SC)
Applegate stonecrop, *Sedum oblanceolatum* (SC)
Marble Mountain catchfly, *Silene marmorensis* (SC)
Howell's tauschia, *Tauschia howellii* (SC)
Shasta River mariposa, *Calochortus monanthus* (SC)

Notes

(E)	*Endangered*	Species that is in danger of extinction throughout all or a significant portion of its range.
(T)	*Threatened*	Species that is likely to become endangered within the foreseeable future.
(P)	*Proposed*	Species that has been proposed in the *Federal Register* to be listed as endangered or threatened.
(CH)	*Critical Habitat*	Area essential to the conservation of a species.
(C)	*Candidate*	Species for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.
(SC)	*Species of Concern*	Species for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.
(CR)	Recommended for candidate status.	
( )	Listing petitioned.	
(*)	Possibly extinct.	

ENCLOSURE B

The goal of the U.S. Fish and Wildlife Service is to conserve, protect and enhance fish, wildlife, and their habitats by timely and effective provision of fish and wildlife information and recommendations. To assist us in accomplishing this goal, we would like to see the items described below discussed in your environmental documents for the proposed project.

Project Description. The document should very clearly state the purposes of, and document the needs for, the proposed project so that the capabilities of the various alternatives to meet the purposes and needs can be readily determined.

A thorough description of all permanent and temporary facilities to be constructed and work to be done as a part of the project should be included. The document should identify any new access roads, equipment staging areas, and gravel processing facilities which are needed. Figures accurately depicting proposed project features in relation to natural features (such as streams, wetlands, riparian areas, and other habitat types) in the project area should be included.

Affected Environment. The document should show the location of, and describe, all vegetative cover types in the areas potentially affected by all project alternatives and associated activities. Tables with acreages of each cover type with and without the project for each alternative would also be appropriate. We recommend that all wetlands in the project area be delineated and described according to the classification system found in the Service's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin 1979). The Service's National Wetland Inventory maps would be one starting point for this effort.

The document should present and analyze a full range of alternatives to the proposed project. At least one alternative should be designed to avoid all impacts to wetlands, including riparian areas. Similarly, within each alternative, measures to minimize or avoid impacts to wetlands should be included.

Lists of fish and wildlife species expected to occur in the project area should be in the document. The lists should also indicate for each species whether or not it is a resident or migrant, and the period(s) of the year it would be expected in the project area.

Environmental Consequences. The sections on impacts to fish and wildlife should discuss impacts from vegetation removal (both permanent and temporary), filling or degradation of wetlands, interruption of wildlife migration corridors, and disturbance from trucks and other machinery during construction and/or operation. These sections should also analyze possible impacts to streams from construction of outfall structures, pipeline crossings, and filling. Impacts on water quality, including nutrient loading, sedimentation, toxics, biological oxygen demand, and temperature in receiving waters should also be discussed in detail along with the resultant effects on fish and aquatic invertebrates. Discussion of indirect impacts to fish, wildlife, and their habitats, including impacts from growth induced by the proposed project, should also be addressed in the document. The impacts of each alternative should be discussed in sufficient detail to allow comparison between the alternatives.

The cumulative impacts of the project, when viewed in conjunction with other past, existing, and foreseeable projects, need to be addressed. Cumulative impacts to fish, wildlife, wetlands and other habitats, and water quality should be included.

Mitigation Planning. Under provisions of the Fish and Wildlife Coordination Act, the Service advises the U.S. Army Corps of Engineers on projects involving dredge and fill activities in "waters of the United States", of which wetlands and some riparian habitats are subcategories. Since portions of this proposal may ultimately require a Corps permit, the Service will subsequently be involved under the Coordination Act. Therefore, if you have not done so already, we suggest that you or your representative consult the Corps regarding onsite wetlands and related habitats that may fall under their jurisdiction, and include this information in the draft document. When reviewing Corps public notices, the Service generally does not object to projects meeting the following criteria:

1. They are ecologically sound;
2. The least environmentally damaging reasonable alternative is selected;
3. Every reasonable effort is made to avoid or minimize damage or loss of fish and wildlife resources and uses;
4. All important recommended means and measures have been adopted, with guaranteed implementation to satisfactorily compensate for unavoidable damage or loss consistent with the appropriate mitigation goal; and
5. For wetlands and shallow water habitats, the proposed activity is clearly water dependent and there is a demonstrated public need.

The Service may recommend the "no project" alternative for those projects which do not meet all of the above criteria, and where there is likely to be a significant fish and wildlife resource loss.

When projects impacting waterways or wetlands are deemed acceptable to the Service, we recommend full mitigation for any impacts to fish and wildlife. The Council on Environmental Quality regulations for implementing the National Environmental Policy Act define mitigation to include: 1) Avoiding the impact; 2) minimizing the impact; 3) rectifying the impact; 4) reducing or eliminating the impact over time; and 5) compensating for impacts. The Service supports and adopts this definition of mitigation and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process. Accordingly, we maintain that the best way to mitigate for adverse biological impacts is to avoid them altogether.

The document should describe all measures proposed to avoid, minimize, or compensate for impacts to fish and wildlife and their habitats. The measures should be presented in as much detail as possible to allow us to evaluate their probable effectiveness.

Because of their very high value to migratory birds, and their ever-increasing scarcity in California, our mitigation goal for wetlands (including riparian and riverine wetlands) is no net loss of in-kind habitat value or acreage (whichever is greater).

For unavoidable impacts, to determine the mitigation credits available for a given mitigation project, we evaluate what conditions would exist on the mitigation site in the future in the absence of the mitigation actions, and compare those conditions to the conditions we would expect to develop on the site with implementation of the mitigation plan.

Mitigation habitat should be equal to or exceed the quality of the habitat to be affected by the project. Baseline information would need to be gathered at the impact site to be able to quantify this goal in terms of plant species

diversity, shrub and tree canopy cover, stems/acre, tree height, etc. The ultimate success of the project should be judged according to these same measurements at the mitigation site.

Criteria should be developed for assessing the progress of the project during its developmental stages as well. Assessment criteria should include rates of plant growth, plant health, and evidence of natural reproduction. Success criteria should be geared toward equaling or exceeding the quality of the highest quality habitat to be affected. In other words, the mitigation effort would be deemed a success in relation to this goal if the mitigation site met or exceeded habitat measurements at a "model" site (plant cover, density, species diversity, etc.).

The plan should present the proposed ground elevations at the mitigation site, along with elevations in the adjacent areas. A comparison of the soils of the proposed mitigation and adjacent areas should also be included in the plan, and a determination made as to the suitability of the soils to support habitats consistent with the mitigation goals.

Because wetland ecosystems are driven by suitable hydrological conditions, additional information must be developed on the predicted hydrology of the mitigation site. The plan should describe the depth of the water table, and the frequency, duration, areal extent, and depth of flooding which would occur on the site. The hydrologic information should include an analysis of extreme conditions (drought, flooding) as well as typical conditions.

The plan must include a timeframe for implementing the mitigation in relation to the proposed project. We recommend that mitigation be initiated prior to the onset of construction. If there will be a substantial time lag between project construction and completion of the mitigation, a net loss of habitat values would result, and more mitigation would be required to offset this loss.

Generally, monitoring of the mitigation site should occur annually for at least the first five years, biennially for years 6 through 11, and every five years thereafter until the mitigation has met all success criteria. Remediation efforts and additional monitoring should occur if success criteria are not met during the first five years. Some projects will require monitoring throughout the life of the project. Reports should be prepared after each monitoring session.

The plan should require the preparation of "as-built" plans. Such plans provide valuable information, especially if the mitigation effort fails. Similarly, a "time-zero" report should be mandated. This report would describe exactly what was done during the construction of the mitigation project, what problems were encountered, and what corrections or modifications to the plans were undertaken.

The plan should detail how the site is to be maintained during the mitigation establishment period, and how long the establishment period will be. It will also be important to note what entity will perform the maintenance activities, and what entity will ultimately own and manage the site. In addition, a mechanism to fund the maintenance and management of the site should be established and identified. A permanent easement should be placed on the property used for the mitigation that would preclude incompatible activities on the site in perpetuity.

Finally, in some cases, a performance bond may be required as part of the mitigation plan. The amount of the bond should be sufficient to cover the costs of designing and implementing an adequate mitigation plan (and purchasing land if needed) should the proposed plan not succeed.

Reference

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service, Washington, D.C. 103 pp.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

July 9, 1996

Mr. Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, California 96101

Dear Mr. Sharp:

Fourmile Hill Geothermal Development Project

The Department of Fish and Game (Department) has reviewed the June 7, 1996, Background Information on Proposed and Past Geothermal Activities within the Glass Mountain Known Geothermal Resource Area. Please refer to our previous comment letter contained within the Fourmile Hill Area Geothermal Exploration Project Environmental Assessment/Initial Study (December 1995). The Department has also commented on adjacent proposed geothermal projects; specifically in our letter dated May 24, 1995, to Mr. Patrick Griffin of the Siskiyou County Air Pollution Control District on the Glass Mountain Geothermal Exploration Project (State Clearinghouse #95041056).

In this current proposed action, Calpine Corporation has submitted their plan of utilization to the Bureau of Land Management for geothermal development activities on Federal geothermal leases CA-21924, CA-21925 and CA-21926. These leases are located on the Klamath and Modoc national forests in Siskiyou and Modoc counties. Calpine proposes to develop a 49.9-megawatt geothermal power plant with associated fluid pipelines in the Fourmile Hill project area. This project also includes construction and operation of a 24-mile, 230-kilovolt transmission line that will ultimately connect to the Bonneville Power Administration Malin-Warner transmission line. The Department offers the following comments.

General Comments

1. The environmental impact statement/environmental impact report (EIS/EIR) for the proposed project should provide a description of the transmission line corridor including width and habitat affected.

2. Methods of pipeline installation should be specified. Overland travel methods, equipment to be used, provisions for pipeline failure, etc., should be documented.

3. All maintenance activities associated with the pipelines and power line should be defined, e.g., herbicide usage, frequency and type of aerial surveys, frequency and type of ground surveys, etc.

4. Cumulative effects from the creation of year-round access to the Medicine Lake Highlands should be thoroughly analyzed. The effects of year-round access on wildlife should be discussed. Cumulative impacts and long-term effects of the project on biological resources should be addressed as part of the project impacts.

5. All information gathered from wildlife and botanical surveys should be provided to the Department for inclusion in the National Diversity Data Base.

Botanical Comments

1. Surveys for special status plant species must be conducted during the appropriate season, using thorough survey methods. Survey method guidelines are attached.

2. Impacts to plant communities including direct loss from construction and secondary loss due to operations should be analyzed and mitigated appropriately.

3. A set of mitigation measures regarding botanical resources should be developed and included in the future EIR/EIS.

4. The potential for noxious weed invasion should be discussed. The provisions for prevention of weed importation should also be discussed.

5. There is a significant natural area (SNA), Modoc 015 Flukey Well, at the eastern end of the power line right of way (ROW), possibly at the site of the proposed substation. The only resource identified at this site, according to the 1993 Annual Summary of SNA's, is *Poa fibrata* (Lassen County bluegrass). This taxon was found to be a hybrid of two other species of *Poa* and is not recognized in The Jepson Manual; this taxon was accepted as a hybrid and rejected from the latest California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* (5th edition). The EIR/EIS should address this SNA and its current status.

Wildlife Comments

1. Potential impacts to wildlife species due to project activities should be addressed. Mitigation measures for wildlife species need to be clearly identified.

2. The impact of surface pipelines on mammal migration routes needs to be analyzed. Winter range habitat for deer and antelope is located east of the proposed geothermal plant. A thorough evaluation of impacts to deer and antelope should be presented in the EIR/EIS.

3. The Department is concerned that populations of special status bats may exist in the project vicinity. Initial investigation studies need to be conducted. If special status bat populations exist, the effects of the project on these populations need to be addressed.

4. During the Fourmile Hill Area Geothermal Exploration Project Environmental Assessment/Initial Study (December 1995) American marten tracks were detected near drill site 85-33 and TGH pad 88-28. Existing marten populations should be identified. The EIS/EIR should address the long-term project related effects on marten habitat. The mitigation measures for marten habitat loss needs to be documented.

5. Efforts to retain valuable wildlife resources such as down woody material, snags and large conifers should be instituted in mitigation design.

6. Noise effects on animal species are not clearly described. Time and duration of noise effects by the various operations should be researched.

7. The potential impacts to birds from project activities need to be addressed. Tule Lake is the wintering grounds for some raptors. The Fourmile Hill Area Geothermal Exploration Project Environmental Assessment/Initial Study (December 1995) revealed the presence of a goshawk pair located near Grouse Hill. Mitigation measures for all birds in or near the project area need to be documented and clearly defined in the EIR/EIS.

8. The potential impacts to birds from the power line corridor due to collisions and habitat loss need to be addressed.

9. Power poles should be designed to prevent electrocution of raptors.

Aquatic Comments

1. The Department is concerned about the impacts that drilling may have on the surrounding resources, particularly impacts on aquifers and aquatic systems. These potential impacts should be thoroughly analyzed and addressed in the EIR/EIS.

2. Impacts to wetlands from construction and operation including ground water withdrawal and injection should be documented.

Hazardous Materials and Waste Comments

1. Provisions for the treatment of hazardous materials need to be addressed.

2. Mitigation measures should include provisions for proper containment of all waste material. Prompt, regular, and frequent removal of any food waste should be emphasized to avoid problems associated with wildlife invading nearby campgrounds.

Recreational Activities

1. The Department has an interest in maintaining and improving opportunities for recreational hunting and fishing. The environmental consequences of the proposed action to these opportunities must be thoroughly discussed. Construction activities may lead to a decline in recreation quality in the area. The qualitative as well as quantitative effects on hunting and fishing opportunities in the vicinity of the proposed action should be addressed.

Thank you for the opportunity to comment on this notice. If you have any questions regarding these comments, please contact staff biologist Mr. John Siperek at (916) 225-2312.

Sincerely,

Richard L. Elliott

Richard L. Elliott
Regional Manager

cc: See attached list.

cc: Messrs. Jim Nelson, John Siperek,
Dr. Rich Lis and Mark Stopher
Department of Fish and Game
601 Locust Street
Redding, California 96001

Messrs. Scott Williams and Cliff Harvey
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Post Office Box 1671
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State of California
THE RESOURCES AGENCY
Department of Fish and Game
May 4, 1984

GUIDELINES FOR ASSESSING EFFECTS OF PROPOSED
DEVELOPMENTS ON RARE AND ENDANGERED PLANTS AND PLANT COMMUNITIES

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how field surveys should be conducted, and what information should be contained in the survey report.

1. Botanical surveys that are conducted to determine the environmental effects of a proposed development should be directed to all rare and endangered plants and plant communities. Rare and endangered plants are not necessarily limited to those species which have been "listed" by state and federal agencies but should include any species that, based on all available data, can be shown to be rare and/or endangered under the following definitions.

   A species, subspecies or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition or disease. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.

   Rare plant communities are those communities that are of highly limited distribution. These communities may or may not contain rare or endangered species. The most current version of the California Natural Diversity Data Base's Outline of Terrestrial Communities in California may be used as a guide to the names of communities.

2. It is appropriate to conduct a botanical field survey to determine if, or the extent that, rare plants will be affected by a proposed project when:

   a. Based on an initial biological assessment, it appears that the project may damage potential rare plant habitat;

   b. Rare plants have historically been identified on the project site, but adequate information for impact assessment is lacking; or

   c. No initial biological assessment has been conducted and it is unknown whether or not rare plants or their habitat exists on the site.

3. Botanical consultants should be selected on the basis of possession of the following qualifications (in order of importance):

   a. Experience as a botanical field investigator with experience in field sampling design and field methods;

   b. Taxonomic experience and a knowledge of plant ecology;

   c. Familiarity with the plants of the area, including rare species; and

   d. Familiarity with the appropriate state and federal statutes related to rare plants and plant collecting.

4. Field surveys should be conducted in a manner that will locate any rare or endangered species that may be present. Specifically, rare or endangered plant surveys should be:

   a. Conducted at the proper time of year when rare or endangered species are both "evident" and identifiable. Field surveys should be scheduled (1) to coincide with known flowering periods, and/or (2) during periods of phenological development that are necessary to identify the plant species of concern.

   b. Floristic in nature. "Predictive surveys" (which predict the occurrence of rare species based on the occurrence of habitat or other physical features rather than actual field inspections) should be reserved for ecological studies, not for impact assessment. Every species noted in the field should be identified to the extent necessary to determine whether it is rare or endangered.

c. Conducted in a manner that is consistent with conservation ethics. Collections of rare or suspected rare species (voucher specimens) should be made only when such actions would not jeopardize the continued existence of the population and in accordance with applicable state and federal permit regulations. Voucher specimens should be deposited at recognized public herbaria for future reference. Photography should be used to document plant identification and habitat whenever possible, but especially when the population cannot withstand collection of voucher specimens.

d. Conducted using systematic field techniques in all habitats of the site to ensure a reasonably thorough coverage of potential impact areas.

e. Well documented. When a rare or endangered plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form should be completed and submitted to the Natural Diversity Data Base.

5. Reports of botanical field surveys should be included in or with environmental assessments, negative declarations, EIR's and EIS's, and should contain the following information:

a. Project description, including a detailed map of the project location and study area.

b. A written description of biological setting referencing the community nomenclature used, and a vegetatio

c. Detailed description of survey methodology.

d. Dates of field surveys.

e. Results of survey (including detailed maps).

f. An assessment of potential impacts.

g. Discussion of the importance of rare plant populations with consideration of nearby populations and total species distribution.

h. Recommended mitigation measures to reduce or avoid impacts.

i. List of all species identified.

j. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms.

k. Name of field investigator(s).

l. References cited, persons contacted, herbaria visited, and disposition of voucher specimens.

Office Copy

PACIFIC BALD EAGLE

RECOVERY PLAN

PACIFIC BALD EAGLE

RECOVERY PLAN

Published by
U.S. Fish and Wildlife Service
Portland, Oregon

Approved: _____
Regional Director, U.S. Fish and Wildlife Service

8/25/86
Date

THIS IS THE COMPLETED PACIFIC BALD EAGLE RECOVERY PLAN. IT HAS BEEN APPROVED BY THE U.S. FISH AND WILDLIFE SERVICE. IT DOES NOT NECESSARILY REPRESENT OFFICIAL POSITIONS OF COOPERATING AGENCIES, AND IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF ALL INDIVIDUALS INVOLVED IN THE PLAN FORMULATION. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS AND CHANGES IN SPECIES STATUS AND COMPLETION OF TASKS DESCRIBED IN THE PLAN. GOALS AND OBJECTIVES WILL BE ATTAINED AND FUNDS EXPENDED CONTINGENT UPON APPROPRIATIONS, PRIORITIES, AND OTHER BUDGETARY CONSTRAINTS.

LITERATURE CITATION SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service, 1986. Recovery Plan for the Pacific Bald Eagle. U.S. Fish and Wildlife Service, Portland, Oregon. 160 pp.

Additional copies may be obtained from:

Fish and Wildlife Reference Service
Informatics General Corporation
6011 Executive Boulevard
Rockville, Maryland 20852
Telephone: 1-800-582-3421
(301) 770-3000

1.26 ESTABLISH A FRAMEWORK FOR RECOVERY PLAN IMPLEMENTATION WHEREBY MANAGEMENT AND RESEARCH ACTIVITIES ARE COORDINATED.

The U.S. Fish and Wildlife Service should coordinate recovery efforts and monitor implementation of the recovery plan at the regional level. At the local level, working teams should have a strong role in implementing the plan. Bald eagle working teams have been effective in Oregon, Washington, California, Montana, and the Greater Yellowstone area. These teams have helped to set priorities, have responded to specific problems, and have coordinated the activities of several groups. Teams usually consist of representatives of agencies, organizations, and private companies responsible for management as well as interested individuals. Each working team should be responsible for developing a local implementation plan that addresses more specific issues than the recovery plan. Where working groups do not exist, either a recovery team representative or an appointed representative of a state wildlife agency should take the lead in notifying local agencies about responsibilities for implementing the plan and in monitoring recovery progress. All work related to the recovery effort (including expenditures, accomplishments, and research results) should be reported to the U.S. Fish and Wildlife Service Regional Office, Portland by 30 September of each year.

1.27 SUPPORT CHANGES IN LOCAL AND FEDERAL TAX PROGRAMS THAT ENCOURAGE LANDOWNERS TO MAINTAIN BALD EAGLE HABITAT.

In the past, various tax programs such as the Federal inheritance tax and county property taxes have encouraged the sale of bald eagle habitat for development. The effects of existing tax programs in each key area with potential for development should be evaluated. Changes in tax structure that encourage retention of bald eagle habitat should be proposed.

1.3 MANAGE BREEDING AND NONBREEDING HABITAT

Habitat management is one of the most important steps in the recovery process and must occur in nesting habitat, habitat used by non-nesters during the breeding season, wintering habitat, and habitat used by eagles during migration. Habitat management must also occur at all levels. At the zone level, management should consist of coordinating the efforts of resource managers from various agencies. The key areas should be the primary focus of habitat management within each zone. At the site-specific level, managers should identify and manage for the specific needs of individual territorial pairs and groups of roosting eagles.

1.31 MAINTAIN AND IMPROVE QUANTITY, QUALITY, AND AVAILABILITY OF FOOD SUPPLIES

Food is probably the single most important component of eagle habitat. Without an uncontaminated and readily available food source, both nesting and wintering populations would diminish. Because the diet is varied and depends on several migratory species, management is complex.

1.311 MANAGE INLAND AND ANADROMOUS FISH POPULATIONS AND HABITATS TO MAINTAIN AND ENHANCE ADEQUATE FOOD FOR EAGLES

Maintenance of a fish supply for eagles involves both basic fisheries management and a conscious effort to ensure that fish are available to eagles. It is essential, of course, to ensure adequate reproduction of fish populations that are now used by eagles. This may entail fish habitat protection measures such as preventing siltation, maintaining natural stream channels, and regulation of water levels and flow rates. It is also important to ensure that fish are available to eagles. Recreation may need to be restricted on some rivers and reservoirs to allow eagles full access to foraging areas during certain critical seasons (see 1.334). Eagles that customarily feed on salmon must have access to the carcasses.

1.3111 MANAGE WATER LEVELS TO MAINTAIN AND ENHANCE EAGLE FOOD SOURCES

Water level management is an important factor influencing the bald eagle's food supply, and existing dams provide numerous opportunities for fisheries management that will benefit eagles. Flow augmentation during periods of salmon migration may be a key to maintenance and restoration of anadromous fish runs on which eagles depend. Generally, minimum stream flows and reservoir conservation pools are essential for maintaining fisheries that are important to eagles. Temporarily low levels at certain times can either enhance foraging opportunities for eagles or decrease survival of important fish populations. The benefits and drawbacks of water level management must be considered in individual situations.

1.3112 ENCOURAGE STOCKING OF FISH IN IMPOUNDMENTS THAT SUPPORT INADEQUATE FISH POPULATIONS

Priority areas for stocking should be locations where stocking will benefit both recreation and eagles. For example, annual stocking of waters that freeze in the winter will provide a source of winter-killed fish for eagles in the early spring and recreational opportunities in the summer.

1.3113 DISCOURAGE STREAM CHANNELIZATION AND LEVEE PROJECTS: PRESERVE WINDING, BRAIDED RIVER STRETCHES

The presence of gravel bars interspersed with deep pools is critical for reproduction of many riverine fish species. Winding, braided river stretches also facilitate stranding of fish during the spawning season, thus making them available to eagles. Stream channel preservation is especially important for salmon spawning areas.

1.3114 PLAN FOR ARTIFICIAL FEEDING PROGRAMS USING HATCHERY FISH DURING EMERGENCY FOOD SHORTAGES

Artificial feeding programs should be initiated in a few unusual situations where natural food sources have been depleted. Techniques have already been implemented on the Skagit and Nooksack Rivers in Washington; dead fish were released into river systems from hatchery holding ponds, and stored frozen carcasses were deposited on open shorelines. This technique will be most appropriate at salmon spawning areas during floods and serious fish population declines. It may also be applicable in situations where fish escapement is inadequate to support eagle populations.

1.3115 REVIEW PROGRAMS TO CONTROL NON-SPORT FISH IN KNOWN EAGLE FORAGING AREAS

Although salmonids are major food sources for eagles in some areas, rough fish, such as carp, chubs and suckers are the primary food in other areas. Programs to control non-sport fish in eagle foraging areas should be carefully reviewed and restricted if necessary to insure that fish populations are sufficient to support the eagles that forage in the area.

1.3116 DISCOURAGE CHEMICAL CONTROL OF AQUATIC INSECTS IN EAGLE USE AREAS

Control of insects with insecticides may threaten eagle populations directly by contamination of food resources or indirectly by decreasing the food supply for fish and ultimately eagles. These programs should be evaluated in key eagle use areas and discouraged where necessary.

1.3117 PROTECT AND ENHANCE NATURAL SPAWNING POPULATIONS AND SPAWNING GROUNDS OF SALMON AND OTHER IMPORTANT FISH SPAWNERS TO INCREASE AVAILABILITY TO EAGLES

In many situations, spawning salmon are intercepted at hatcheries, stripped of eggs, and processed for human use. Fewer fish spawn naturally to become available to eagles. Eagles rely on the spawned-out salmon carcasses, and naturally spawning populations must be maintained.

1.3118 MAINTAIN AND IMPROVE HABITAT FOR FISH BY REDUCING SILTATION FROM LOGGING, ROADS, AND OVERGRAZING

Excessive siltation that often results from poorly planned logging, road building, and grazing operations can interfere with fish reproduction and also make fish unavailable to eagles. Managers should address this problem in all drainages associated with existing or potential bald eagle habitat.

1.312 MAINTAIN AND ENHANCE AVIAN AND MAMMALIAN FOOD SOURCES

Avian and mammalian prey are a primary food of eagles in some areas and a secondary prey in most others. It is important that alternate prey be available to eagles in the event of serious fish die-offs or contaminations.

1.3121 MAINTAIN AND ENHANCE WETLAND AREAS FOR WATERFOWL PRODUCTION

Waterfowl comprise a significant portion of the eagle diet throughout the west; their reproduction must be maintained at eagle breeding areas in the Pacific recovery area as well as further north. Waterfowl produced in Canada are important to wintering eagle populations in the Pacific recovery area.

1.3122 ENHANCE WATERFOWL HABITAT ON BALD EAGLE WINTERING AREAS

Because of their importance both as a primary and secondary eagle food source, waterfowl populations should be encouraged to use areas of open water where bald eagles winter. A small population of waterfowl can support many wintering eagles. Waterfowl habitat management can include water level management and establishment of food plots, such as fields of unharvested corn.

1.3123 LEAVE AVIAN AND MAMMALIAN CARCASSES ON SITES FOR FUTURE USE BY EAGLES

Dead birds and mammals provide important food for eagles in the winter and early spring. Livestock and game carcasses should be removed from eagle use areas only if contaminants or disease agents are present, human health is endangered, or the location of the carcasses (e.g. on roads or railroad tracks) could cause eagle injuries or mortalities. In emergency weather situations, it may be desirable to deposit carcasses at eagle use areas. State conservation officers should develop plans for distributing road-killed game during emergency situations.

1.3124 ENCOURAGE FLOODING OF FIELDS DURING WINTER, WHERE APPROPRIATE, TO MAKE RODENTS AVAILABLE TO EAGLES

Flooding of agricultural fields for the purpose of rodent control provides an important food source for wintering eagles in the Klamath Basin. As many as 4,400 bald eagle use-days were recorded on one ranch during December 1981. Many farmers use flooding as an alternative to poisoning and thereby do not contaminate potential eagle food sources (see 4.121).

1.32 MAINTAIN AND IMPROVE FORESTED HABITAT IN BOTH THE BREEDING AND WINTERING RANGE

Timber stands should be managed to promote habitat characteristics required by eagles for long-term nesting and roosting. In most cases, this requires management for old-growth stands. Silvicultural techniques, such as thinning or selective harvest, can help to create proper tree species composition and stand structure. The important element of any silvicultural plan should be to maintain an old growth overstory in the vicinity of nest sites and communal roosts. Development and maintenance of potential eagle habitat is as important as protection and maintenance of habitat currently used by eagles.

1.321 MAINTAIN FORESTED HABITAT THAT IS PRESENTLY USED BY EAGLES

Habitat loss is currently the most significant threat to bald eagle populations in the 7-state recovery area. The increasing disappearance of old growth stands makes it imperative that existing habitat be protected. In some cases special actions must be taken to maintain existing habitat.

1.3211 PROHIBIT LOGGING OF KNOWN NEST TREES, PERCH TREES, AND WINTER ROOST TREES

Trees used by eagles should be clearly identified and protected from logging. In addition, trees that provide wind breaks, that visually shield eagles from disturbances, or that are needed for long-term viability of eagle use areas must be maintained. Trees with unoccupied nests in suitable habitat and trees which formerly had nests should also be protected because these sites are sometimes used after several years of abandonment and will be important in providing habitat for expanding populations.

1.3212 MANAGE TIMBER STANDS USED BY EAGLES TO PREVENT INSECT INFESTATIONS WHERE APPROPRIATE

Pine beetles (Dendroctonus spp.) are a possible threat to eagle habitat in certain areas within the Pacific recovery area. Control of stocking level is perhaps the best method available to prolong the life and health of currently suitable nesting, roosting, and perch trees. Removal of true firs and other understory species in pine forests can reduce stress and susceptibility of pines to bark beetle infestation. Old growth Douglas-fir trees are not necessarily high risk, they often survive for centuries on extremely limited branch systems (J. Franklin, pers. comm.). Caution should be used in salvaging bark beetle infested stands which have value to eagles.

1.3213 WHERE APPROPRIATE, STABILIZE STREAMBANKS AND SOILS TO PROTECT NESTING, PERCHING AND ROOSTING TREES

Erosion may eliminate suitable nesting, roosting, and perching trees along some rivers. Riprap and other forms of streambank stabilization should be considered if water level manipulations cannot reduce erosion.

Soil stabilization may be an effective tool to prolong the life of traditional nest sites in areas with severe erosion. Revegetation of disturbed areas should be initiated immediately, and where warranted brush check dams should be installed in gully situations. If supporting soil for a nest tree's root system is being lost to erosion, any practical method that will halt the action should be used.

1.3214 DEVELOP CONTINGENCY PLANS TO PROTECT NESTING AND WINTERING HABITAT IN EMERGENCIES, E.G., WILDFIRE PRE-ATTACK OR PREVENTION PLANNING

Fire management plans should contain 2 types of recommendations regarding important bald eagle habitat. First, the plan should identify nests, roosts, and important perch trees that should be priorities for fire suppression. Second, the plan should include guidelines for minimizing disturbance to eagles and their habitat during fire suppression efforts.

1.3215 PRESERVE SNAGS IN EAGLE USE AREAS

All snags that are potential eagle perches within 500 m (1650 ft) of nests or roosts should be preserved. In addition, all snags utilized for roosting or foraging within nesting territories or communal roosts should be protected.

1.322 MAINTAIN AND DEVELOP NESTING AND ROOSTING HABITAT FOR FUTURE USE BY EAGLES

Recovery of the bald eagle in the Pacific recovery area depends on the availability of habitat for an expanding breeding population. Suitable (see 1.12) but currently unused habitat must be protected and maintained in a favorable condition, especially in the Target Recovery Territories (Appendix A) but also at other appropriate locations. In addition, managers should maintain and develop replacement habitat near currently used habitat, especially if existing perches, nesting trees, roosting stands, or foraging opportunities are in a precarious or deteriorating condition. Managers should plan to develop potential nesting and roosting stands at eagle use areas in a series of successional stages to ensure the presence of suitable habitats for many years. In some cases, active steps should be taken to ensure the long term suitability of such habitats.

1.3221 MANAGE YOUNG TREE STANDS TO MEET DESIRED PHYSICAL CHARACTERISTICS

Eagles prefer large trees with an open branching pattern. This growth form cannot be produced in extremely dense stands. Control of stocking levels can be used to promote growth of trees with the desired open branching pattern, to create openness around potential nest and perch trees, and to stimulate large tree growth.

Silvicultural prescriptions should be developed for maintaining or accelerating growth of suitably formed nest, perch, and roost trees to ensure their long term availability.

1.3222 PLANT NEW TREES IN POTENTIAL BALD EAGLE USE AREAS DEVOID OF TREE REPRODUCTION

The lack of suitable perches, nesting sites, and roost sites may be a factor limiting the abundance of eagles in some areas. Establishment of new perches can not only increase the amount of suitable habitat but also attract eagles away from potentially hazardous situations (power lines, roads, shooting).

Tree planting is especially suitable along the shorelines of newly established reservoirs. Most new plantings should be within 0.5 km (0.3 mi) of a shoreline. It may also be advisable to establish windbreaks near new stands intended to be roosts. Cottonwoods, sycamores, maples, and ponderosa pine would be the best species to plant because of their rapid growth rates and suitable physiognomy.

1.3223 PROVIDE ARTIFICIAL PERCHES AND NEST STRUCTURES WHERE NATURAL SITES ARE NOT AVAILABLE

Do not depend on artificial perches to be effective replacements for natural wooded habitat. Artificial perches on bald eagle wintering areas have been only occasionally successful. Experiment with unique perch designs, especially near feeding sites in treeless areas. Artificial structures should be considered when awaiting growth of tree perches. Artificial structures for nesting sites have had mixed success. They may be useful to reinforce existing natural nests with inadequate support or to provide a replacement nest in a territory where a nest has blown out. They are of limited use in areas where no natural nests have existed.

1.3224 CREATE SNAGS WHERE SUITABLE PERCH TREES ARE NOT AVAILABLE

Interspersed snags in coniferous stands seem to provide the openness that eagles prefer. Where snags number less than 5 per acre within a nesting territory, the territory management plan (see 1.25) should consider creating large snags close to eagle use areas. It is probably not necessary to deliberately create snags in deciduous stands because eagles readily use live trees when dead trees are not available. It is best to allow trees to attain maximum size before girdling, blasting, torching, or inoculating. Girdling is probably the most economical and effective technique, but topping and limbing have also proven effective in creating desired perch sites. Cull trees, which do not have commerical value, can be selected for girdling.

1.33 RESTRICT HUMAN DISTURBANCE AT EAGLE USE AREAS

Human activities are known to disrupt eagle activity patterns and in some cases cause reproductive failure. In spite of this, many eagles nest and winter near human population centers. Many types of human disturbances at the right distances are compatible with eagles. Regulation of human activity is a critical part of eagle habitat management.

1.331 ESTABLISH BUFFER ZONES AROUND NEST SITES

Buffer zones should be established for individual nest territories based on the location of nest trees, perch trees, and flight paths, as well as stand characteristics, known individual tolerances, and weather patterns.

Until site specific plans are available or until guidelines can be developed by local groups or agencies, guidelines prepared by the U.S. Fish and Wildlife Service Region I should serve as minimum protective measures.

1.332 EXCLUDE LOGGING, CONSTRUCTION, HABITAT IMPROVEMENT, AND OTHER ACTIVITIES DURING CRITICAL PERIODS OF EAGLE USE

Picnicking, camping, blasting, firearm use, timber harvest, and low level aircraft operations should not be allowed within 400 m of nests and roosts during periods of eagle use. These activities should also be regulated up to 800 m from nests and roosts where eagles have line-of-sight vision. Critical nesting periods vary throughout the recovery area but generally fall between 1 January and 31 August. Key wintering areas, need protection from disturbance from approximately 15 November to 15 March.

1.333 PROHIBIT BUILDING CONSTRUCTION NEAR KEY BALD EAGLE NESTING AND WINTERING HABITATS

Permanent structures that are occupied during periods of eagle use should not be constructed near nesting or winter use areas. Buildings should be no closer than 400 m from the shorelines of feeding waters. Wooded summer campgrounds and small farming operations are probably compatible with winter eagle use, but campgrounds in most wintering areas should be closed from November to March.

1.334 PROHIBIT VEHICLE TRAFFIC AT SENSITIVE KEY AREAS DURING PERIODS OF EAGLE USE

Snowmobile, boat, and automobile traffic can disturb eagles in some areas. Roads should be closed to protect nesting areas, when appropriate, and snowmobiles should be prohibited from traveling near nesting and wintering habitat during periods of eagle use.

Land use plans should guide human activity away from important feeding perches and prevent human disturbance in nesting and roosting areas.

Buoys and booms can be used to channel boat traffic away from sensitive eagle use areas. At Shasta Lake, California, this approach, in combination with shoreline signing and recreational maps, has reduced conflicts between eagles and recreationists (Detrich pers. comm.).

The impacts of automobile traffic can be lessened if people remain in their vehicles. In addition, eagles may grow accustomed to the presence of humans at certain locations. Appropriate signs at these viewing points could educate the viewing public about bald eagle ecology and management.

4. AUGMENT BALD EAGLE POPULATION LEVELS THROUGH MANAGEMENT AND PROTECTION

Direct manipulation of population levels involves both reduction of mortality and population augmentation. Reduction of unnatural (human related) mortality should be the main thrust of recovery efforts. Population augmentation programs should be a low priority at this time.

4.1 REDUCE BALD EAGLE MORTALITY

Perhaps the most important element necessary to reduce human-related mortality is a well-executed public education program that identifies protective laws pertaining to the bald eagle and ecological reasons for maintaining viable populations (see Part 3.1).

4.11 REDUCE BALD EAGLE MORTALITY ASSOCIATED WITH SHOOTING AND TRAPPING

Shooting continues to be the most common cause of bald eagle mortality. Uncontrolled shooting could easily lead to the decimation of nesting and/or wintering populations in local areas. Aggressive law enforcement and public information and education programs (see Sec. 3.2) will be the most effective way to reduce shooting and trapping mortality. It also may be necessary to control or regulate public access in areas where shooting or trapping problems have been identified. Roads should be closed in some areas during critical periods of eagle use. Nest wardens may be required at nests near human population or recreation centers (see 3.3). Habitat management techniques (see 1.32) should also be used in these cases to keep eagles away from hazardous situations.

4.12 REDUCE EXPOSURE OF BALD EAGLES TO CONTAMINANTS

The ban on DDT in the early 1970's may have been the most significant step taken to date to halt the decline of bald eagle populations. Unfortunately, however, other life-threatening chemicals continue to be used. There is increasing evidence that organochlorines are depressing eagle productivity in some areas to the extent that local nesting populations may be unable to replace themselves over the long term. The presence of other harmful contaminants (e.g., lead, organophosphates) could lead to the extirpation of eagles from local areas. Pesticide application and toxic waste disposal should be monitored closely by the appropriate regulatory agencies to assure that these contaminants are not released into bald eagle use areas. All recovered eagle carcasses should be analyzed to ascertain contaminant levels and the actual contribution that contaminants made to the death.

4.121 RESTRICT USE OF POISONS DETRIMENTAL TO EAGLES IN PREDATOR AND RODENT CONTROL PROGRAMS WITHIN IMPORTANT BALD EAGLE NESTING AND WINTERING HABITAT

Rodent and jack rabbit control with strychnine has been identified as a recurring cause of bald eagle mortality, and compound 1080 has been responsible for at least one bald eagle death in the West (National Wildlife Health Laboratory 1985). Extreme caution should be taken whenever control programs are initiated in traditional eagle use areas. If it is determined that bald eagles feed in the area, the control program should be disallowed or structured in such a way as to have no effect on eagles. Safer, alternative chemicals should be considered. If existing regulations are inadequate to protect the bald eagle, new legislation or regulations should be encouraged.

4.122 PROMOTE THE USE OF NONTOXIC SHOT FOR WATERFOWL HUNTING.

Studies have shown that bald eagles are very susceptible to lead poisoning. It is most likely to be a problem in crowded hunting areas where concentrations of waterfowl occur. Nontoxic shot zones have been identified (51 FR 409, Jan. 6, 1986), and efforts should be continued toward their implementation as soon as possible.. Agencies should cooperate with user groups to develop nontoxic shot programs regionwide.

4.123 DEVELOP CONTINGENCY PLANS TO DEAL WITH DISEASE AND CONTAMINANT EMERGENCIES

Even the best regulations will not avert sudden disease outbreaks, oil spills, or other contaminant emergencies that may threaten eagles. Plans should be developed that outline steps to detoxify the environment, prevent eagles from becoming exposed to contaminants, and care for sick birds in the event that they do.

4.13 REDUCE IMPACT AND ELECTROCUTION MORTALITY ASSOCIATED WITH POWER LINES

Significant steps have been taken by power companies in the Pacific recovery area to prevent raptor electrocution by using innovative construction techniques. Power companies should be encouraged to continue policies for distribution line and transformer construction that will minimize impact and electrocution of raptors. Such approaches should also apply to wind-energy developments in bald eagle habitat. A good working relationship should be cultivated between wildlife agencies and power companies. News releases should be encouraged identifying any positive action taken by power companies to prevent raptor electrocutions and collisions.

4.131 REPLACE OR MODIFY PROBLEM POWER LINE STRUCTURES, USING ACCEPTED DESIGNS

Individual power line structures that have electrocuted eagles should be modified or replaced following accepted guidelines to prevent raptor electrocutions. Any other similar structures in areas used by bald eagles should also be modified. State agencies should establish an information exchange system concerning poles that have been associated with raptor mortalities as well as poles that are regularly used by eagles. All information on electrocutions and pole use should be forwarded to these state agencies, and they, in turn, should regularly make this information available to the power companies and agencies responsible for administering rights-of-way.

New lines in areas used by eagles should consist entirely of electrocution-proof structures, and electrocution-proof structures should be used to replace old deteriorating structures in existing lines. These guidelines should be followed by land management agencies in issuing new rights-of-way or in renewing existing permits.

4.132 RESTRICT POWER LINE CONSTRUCTION WITHIN IDENTIFIED FLIGHT LANES NEAR WINTER ROOSTS

Power lines should not be constructed within 1.5 km (1 mi) of communal roosts. Eagles use these areas during fog, strong winds, and poor light conditions; and the potential for collision is high. Corrective measures should be implemented in any areas where repeated collisions (more than 1) are documented.

4.14 REHABILITATE SICK, INJURED, AND ORPHAN BALD EAGLES FOR RELEASE INTO THE WILD

Rehabilitation efforts are a low priority in the overall recovery effort. However they can serve an important role in identifying mortality factors and in educating the public. Some rehabilitated eagles can be released back into the wild, and others can be used in captive breeding programs. Although rehabilitation can reduce individual mortality, rehabilitation efforts may have negligible effects on overall population levels.

Rehabilitation should be authorized at a few well-qualified centers instead of numerous small facilities. The public and agency personnel should be made aware of the existence and purpose of approved rehabilitation centers. Through a coordinated information program, rehabilitation personnel should be kept informed of recent technical advances. Bald eagles that are fully rehabilitated should be released into suitable areas using appropriate methods. Success of the rehabilitation efforts should be assessed through banding, color marking or telemetry. Close cooperation with other bald eagle workers and active public education programs should be encouraged to evaluate rehabilitation efforts.

4.2 AUGMENT BALD EAGLE POPULATIONS IN SPECIFIC GEOGRAPHIC AREAS USING TESTED MANAGEMENT TECHNIQUES

Habitat management and protection should be the main focus of recovery efforts. However, if it is determined that the natural productivity of selected bald eagle populations is below the potential or when suitable habitat is unoccupied, manipulatory techniques should be implemented. In both of these cases, the guidelines in the U.S. Fish and Wildlife Service Bald Eagle Translocation Policy should be followed.

4.21 ENHANCE PRODUCTIVITY OF PAIRS NESTING IN THE WILD

Foster-parent programs can increase production of some pairs, depending on the factors responsible for reproductive failure. These techniques are usually costly and should only be used in situations where enhanced reproduction is critical for recovery of a remnant population.

Fostering can be appropriate if a nesting pair historically has failed to hatch eggs, or if eggs hatch but nestlings die. Young of an appropriate age can be transplanted into nests of nonproductive pairs from captive sources or from healthy populations. Nesting attempts in which one member of a pair has died or in which fratricide is likely to occur should be priority sources of foster nestlings. Fostering can also be used to assist nesting attempts where fratricide limits production. In these cases the weakest eaglet from a nest with two or more nestlings could be removed, raised in captivity, and returned to its own nest at an appropriate age.

4.22 ESTABLISH NEW BREEDING POPULATIONS IN SUITABLE HABITAT BY TRANSLOCATION

Areas with potential bald eagle nesting habitat should be evaluated for re-introduction potential (see 1.12). If it is determined that establishment of a nesting population is feasible and will benefit the species, captive-produced young or nestlings from healthy breeding populations should be "hacked" using acceptable techniques (Engel and Isaacs 1981).

4.23 DEVELOP CAPTIVE BREEDING PROGRAMS TO SUPPLEMENT NATURAL POPULATIONS WHEN NEEDED

Wild populations may not be capable of supplying birds for all hacking and fostering efforts indefinitely. If shortages of birds occur in the future, captive-bred young could be used in hacking programs to augment or restore some eagle populations in the Pacific recovery area.

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Field Area
Pacific Great Basin System Support Office
600 Harrison Street, Suite 600
San Francisco, California 94107-1372

IN REPLY REFER TO:

L7619 (PGSO-PP)

JUL 12 1996

Mr. Randall Sharp
USFS-BLM EIS\EIR Coordinator
Fourmile Hill Geothermal Development Project
800 W. 12th Street, Alturas, CA 96101

Dear Mr. Sharp,

Thank you for affording us this early scoping opportunity to respond concerning the geothermal development proposed for the Fourmile Hill site within the Glass Mountain Known Geothermal Resource Area (GMKGRA). We are aware that U. S. Forest Service, Bureau of Land Management, and Bonneville Power Administration will be directing third-party preparation of an Environmental Impact Statement. Concurrently Siskiyou County will direct preparation of an Environmental Impact Report. In our comments which follow, we will refer to this joint effort with the term "EIS\EIR".

The National Park Service (NPS) commented on the exploration phase of this proposed action on June 11, 1993. We request that our earlier concerns and suggestions (focused on mitigation measures to safeguard natural resources, water and air quality, viewshed, sensitive species, and recreational values) also be considered during this phase of the overall development proposal.

As matter of record, the proposed 49.9MW geothermal power plant (with its appurtenant production and injection wells, pads, roads, and 24-mile 230KV transmission line) is in close proximity to the entire southern boundary of Lava Beds National Monument (LABE). Environmentally sensitive project analysis and planning is essential. Towards that end, we wish to call your attention to the following considerations (listed in non-priority order):

As you know, the designation of the Modoc Volcanic Scenic Byway was intended to promote and enhance recreational and aesthetic values associated with vehicle-dependent tourism in the region. This proposal has the potential to increase commercial traffic, during both its implementation and operational phases. This consequence should be quantified, and the effect of such an increase on both driving experience and ambient air quality should be analyzed. Routing alternatives which avoid passing through LABE should be identified.

Unimpaired viewshed is an important part of the LABE visitor experience. Siting analysis for the proposed 120-foot wide corridor for the transmission line should include several LABE vantage points; the park's staff will be pleased to assist in identifying these

locations. Regarding the transmission line itself, painting media for towers (and associated structures) which are non-reflective and earth-toned in color should be identified.

Of course, the plumes of water vapor inherent with such developments are unavoidable. Yet as noted above, scenic quality in the region is well known. As a result, we suggest that the current regional status of "horizon" visual resources be documented during the preparation of the EIS\EIR. This will establish a baseline from which it will be possible in the future to detect whether (and to what degree) the plume affects tourist experience. We also request that during the preparation of the EIS\EIR that the most current (and perhaps imminently available) "best control technologies" be identified and appropriate alternatives developed.

Site analysis for both the transmission line and the power plant and appurtenant facilities should include thorough evaluation of status of cultural, historic, and archaeological resources; necessary mitigations and possibly sites to avoid should be identified.

Hantavirus and bubonic plague vectors are known to exist in the immediate area. We urge that from the standpoint of safeguarding worker safety, the nature and extent of risk of exposure to these public health hazards (and suitable precautionary measures) be assessed in the EIS\EIR.

Protecting wildlife and critical habitat must be achieved to the greatest extent possible, particularly for Bald Eagles and Townsend's Big Eared Bats. Key environmental consequences which must be identified and analyzed include: (1) effect on known eagle nesting sites and winter roosts (documented in the recently approved Caldwell/Cougar Bald Eagle Winter Roost Management Plan); (2) effect on lava tube and cave habitat for Big Eared bats (recently a Category 2 species and now a Species of Special Concern); (3) disruption of peregrine falcons and great grey owls; (4) disruption of reptiles and amphibians; (5) disruption of any herd or other animal movements, and indirect consequences to predators such as mountain lions; and (6) disruption of cave and lava tube flora and fauna.

The proposed 24-hour operation of the geothermal plant has the potential to negatively impact two known contributors to park visitor's experience--natural quiet and pristine night sky. LABE Wilderness visitors particularly expect to experience natural quiet and an undiminished night sky. The potential for the proposed 24-hour schedule (operating noise and night-time illumination) to disrupt these and related aspects of park visitor experience should be assessed.

Related to this, the current condition of minimal aircraft flights above or near LABE enhances the solitude which visitors enjoy. Should aircraft usage be proposed for the operational (and possibly the implementation) phase, NPS will of necessity oppose this. Increased overflights would not only diminish natural quiet, this would increase the potential for downed aircraft within LABE and disruption of wildlife during key periods such as nesting or migration.

The LABE Wilderness, designated October 13, 1972 (PL92-493) constitutes a significant Class I airshed, which is the most stringent category assigned by Congress. Means to implement and operate below (and in any event not exceed) the maximum allowable micrograms per cubic meter for any particulate should be identified and evaluated.

Regional hydrological dynamics are complex, doubly so given the interlaced nature of lava tubes, fissures, and similar geologic structures. Consequently we urge the EIS\EIR include current status of literature and data on water quality and quantity in and surrounding the GMKGRA. Also, the potential for drawdown of the local water table should be carefully assessed. The effect of such changes upon availability of potable and untreated water for use in LABE must be assessed (the only source of drinking water for the monument is a 758-foot well directly downstream from the site currently proposed for the geothermal plant). Towards this end, among the consultants who may be engaged during preparation of the draft EIS\EIR, we suggest that Mr. Michael Storey, U. S. Geological Survey, Menlo Park, California be contacted (he has considerable experience with identifying and assessing similar issues adjacent to Lassen Volcanic National Park).

Ultimately, any construction activities would impact vegetation cover and possibly distribution. We recommend that all landscaping and revegetation be accomplished with site-derived native plant materials (consultations with staff at the Natural Resource Conservation Service's Plant Materials Center in Aberdeen, Idaho would be conducive to this). Implementation and operation activities, particularly movements of vehicles and equipment, have the potential to aid in dispersal of seed. Measures to prevent introduction or control spread of alien plant species and noxious weeds should be identified.

Again, thank you for the opportunity to comment on the scoping document. If you have any questions regarding our comments, please contact Pacific Great Basin System Support Office Environmental Program Leader Alan Schmierer (415)744-3971. However, the primary contact for the National Park Service regarding this proposal will be Mr. Craig Dorman--he may be contacted at Lava Beds National Monument, P.O. Box 867, Tule Lake, CA 96134 or via telephone (916)667-2282.

Sincerely,

George F. Turnbull

George Turnbull,
Superintendent, Pacific Great Basin System Support Office

cc:
LABE, Supt
PWFA-SP
PGSO-PR

Letter AH

SANTA CRUZ RAINFOREST ACTION GROUP (SCRAG)
1601 Jarvis Road, Santa Cruz, Ca 95065
(408) 459-6774 fax (408) 469-0774

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Re: OPPOSITION to Four Mile/Telephone Flat Projects - Medicine Lake Highlands.

Dear Mr Sharp:

On behalf of the Santa Cruz Rainforest Action Group, I would like to express our extreme opposition to the CalEnergy and Calpine geothermal projects proposed for the Medicine Lake Highlands. This is yet another corporate "boondoggle" at the expense of the American taxpayers and our precious PUBLIC LANDS. Our public lands must not be for sale to the highest bidder. AH.1 This area contains ancient forests and an ecosystem which warrants the highest level of protection. These projects would destroy ancient forests, degrade the ecosystem, and destroy the visual, recreational, and spiritual values of this beautiful area. AH.2 The time for unlimited exploitation of our public lands must come to a screeching halt. Our planet can not withstand the continual destruction of our ancient forests and sensitive ecosystems for mere short term economic gain. We must stop all mineral extraction, logging, and other destructive practices on our National Forests immediately: 100 years of devastation by industry with the aid of the Forest Service and other PUBLIC agencies is enough! AH.3

Please do the right thing, and protect these natural heritage resources for future generations - deny these projects in their entirety and work diligently toward permanent protection of this area through a National Monument designation. Thank you for your consideration.

Sincerely,

Ray Newkirk
Executive Director

Letter AI

Renewable Northwest Project

Renewable Northwest Project
A project of the Northwest Conservation Act Coalition

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CE Exploration
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Citizens Utility Board
Natural Resources Defense Council
Northwest Environmental Advocates
Oregon State Public Interest Research Group
Portland Energy Conservation Inc.
Oregon Alternatives, Inc.
Sierra Club
Solar Energy Association of Oregon
NETECH Windpower
Oregon Environmental Council

October 30, 1997

Randall Sharp, Project Leader
USFS/BLM Fourmile Hill
Geothermal Development Project EIS
800 West 12th Street
Alturas, CA 96101

Re: Fourmile Hill Geothermal Project Draft EIS

Dear Mr. Sharp,

We welcome this opportunity to comment on the Draft Environmental Impact Statement for the Fourmile Hill Geothermal Development Project. The Renewable Northwest Project (RNP) is an organization consisting of environmental groups, consumer organizations, renewable energy developers and energy efficiency companies. Northwest Environmental Advocates (NWEA) is an environmental advocacy organization working on clean air and clean water issues.

RNP and NWEA work to move the electricity generating system to a more sustainable path, including the implementation of environmentally responsible renewable technologies. Recently, RNP and NWEA also led the development of a new law in Oregon creating the first mandatory standards in the US to control the emissions of the most prevalent global warming gas, carbon dioxide. AI.1

Renewable resources need to be examined within the context of the resources they can displace or help avoid. Proceeding with a properly sited project will benefit the region's environment and help to shift the region away from fossil fuels and toward environmentally benign and sustainable power resources. We support the development of Fourmile Hill Geothermal Project, as outlined in the preferred alternatives in Draft EIS, for the following reasons and with the following qualifications.

Environmental Benefits of the Project

The Fourmile Geothermal Plant will help retire older, dirty coal and natural gas plants, or eliminate the need to build newer ones. As proposed, the Fourmile Geothermal Plant could displace annual emission of at least 300,000 tons of CO_2, 2,200 tons of SO_x, 1,200 tons of NO_x and 1,300 tons of methane[1]. AI.2

[1] Based on emissions and fuel data from the US Energy Information Agency and US Environmental Protection Agency.

The current system of generating electricity has enormous environmental impacts. Fossil fuels produce about half of the electricity generated in the Western Grid. Large hydro accounts for another 30% to 35% of generation. The Fourmile Hill Project provides an opportunity to avoid some of these destructive resources.

According to the EPA, air emissions from burning fossil fuels (coal, petroleum, and natural gas) to generate electricity account for 71% of all sulfur oxides; 35% of all carbon dioxide, 32% of all nitrogen oxides, 18% of all methane, and almost 9% of all regulated particulate matter (PM-10). The Exxon Valdez accident alone resulted in the death of 500,000 birds.

Fossil fuels are major sources of acid rain, pollution-caused illnesses, habitat destruction, and smog. The fuel cycle, from extraction to combustion of fossil fuels, results in the vast majority of human-made releases of greenhouse gases. Large hydro has been a significant cause of the drastic decline in anadramous and resident fisheries along the West Coast.

The pace of fossil fuels development has picked up. The western grid has been in a rush to add gas-fired power plants and increase its addiction to fossil fuels. About 1,400 megawatts (MW)of gas-fired power plants were built in the Northwest over the last four years. These plants can spew more than 5,000,000 tons of CO_2 per year -- the pollution equivalent of nearly 1,000,000 cars every year. Another 5 gas-fired power plants have recently come on line in California.

Stocks of salmon and steelhead are being listed on the endangered and threatened species lists. Energy conservation programs have been cut in the Northwest by as much as 70% by major utilities. The current reality is that the electricity system is on a path to be more and more reliant on highly destructive hydro and fossil fuel resources.

Nuclear power plants in California and Washington are aging and as many as four are likely to be closed within five years. Without established sources of clean, alternative energy, these plants will be replaced with more fossil fueled power plants. It is critical that we take steps now to avoid being backed into a continually unsustainable corner.

As mentioned above, the Fourmile Geothermal Plant has net emissions significantly less than traditional electricity sources. The amount of CO_2 emissions the plant will help avoid and offset each year is sizable -- as much as the annual emissions of at least 60,000 cars.

Transmission Line Routes and Project Development

The preferred alternatives recommend a reasonable development plant, but we believe there are opportunities to further minimize impacts. The defined alternatives 5 and 6 for the transmission route appear the best. They avoid the MT Hoffman RRA, the MLSA south of Glass Mountain and avoid Medicine Lake. This will take advantage of existing roads and will stay away from areas managed as late successional reserves. AI.3

We ask you to consider other northern routes near alternatives 5 and 6 that can minimize impacts even further, create more of a buffer from the MT Hoffman RRA, continue to take AI.4

advantage of the extensive network of existing roads, and as much as possible avoid areas with late seral reserves.

We also ask that you examine all reasonable foreseeable actions in selecting the final transmission routes. For example, the upcoming EIS process for the Telephone Flat identifies another potential project that could present interconnection issues with the preferred routes for the Four Mile Hill Project. Taken together, is the preferred route for the Four Mile Hill Project also a route that minimizes impacts when a subsequent project is developed? AI.5

We would also ask that you clarify and identify the type and amount of mitigation for the limited impacts from project development. We believe that there must be opportunities in the Klamath and Modoc Forests to fully mitigate for the direct impacts of building the geothermal project. Working with the environmentalists and developers, there is an opportunity to leverage this project into something that creates a net improvement in habitat protection of the forests or nearby wildlife areas. AI.6

Summary

As you examine this development, we ask you to consider the broader benefits of renewables and the greater damage they help to avoid. Renewable resources neither harm fish nor create the air, water and land pollution associated with fossil fuels or hydro. The growing need to control green house gas emissions will create a greater need for very low emission resources such as the Four Mile Hill Geothermal Project. AI.7

The Four Mile Hill Geothermal Project is geographically located to provide power to both Northwest and Southwest consumers. It can take advantage of ongoing market developments in all parts of the western grid. The power is needed and will be used. The project can leverage its location to provide clean power to wherever it is demanded. AI.8

We can not get to a sustainable environment and economy without renewable resources. With the limitations noted above, we support the preferred alternatives outlined in the Draft EIS for the Four Mile Hill Geothermal Project. AI.9

We look forward to participating in this process.

Sincerely,

Rachel Shimshak
Project Director

Peter West
Senior Policy Associate

Eugene Rosolie
Green Power Project
Northwest Environmental Advocates

Tionesta Residents
HC 60, Box 8
Tionesta, CA 96134

August 11, 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development
Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

We, the undersigned residents of Tionesta, are on record as strongly objecting to the proposed transmission line routing for the two geothermal projects proposed for the Medicine Lake area. Our oral comments at your scoping session of June 26, 1996 and our letter to you, dated June 3, 1997, outlined our principal concerns. A copy of the aforementioned letter is attached for your information.

We recently received a copy of the draft EIR for the Fourmile Hill project and have reviewed some relevant portions of the information presented. We are alarmed by the numerous errors in the study, by the apparent minimal consideration of our concerns, by the contradictory statements and by the ill-founded conclusions. Of paramount alarm to us are the following broad conclusions which seem to ignore logic and the facts:

> "...because of the moderate forest cover of ponderosa pine and junipers, the presence of the proposed line would not substantially alter the intactness of the landscape character as perceived from Tionesta..." (Pg 4-169)
>
> "Project construction would also not be expected to affect property values in Tionesta. ..... In addition, there are five existing transmission line corridors with multiple lines in the vicinity of Tionesta. Placement of an additional transmission line within the area is not expected to negatively affect property values." (Pg 4-301)
>
> "At Tionesta, a portion of segment C1 of the transmission line would be visible. .... The proposed transmission line would not be expected to be visually prominent in the landscape around Tionesta and would not significantly affect views from Tionesta. (Pg 4-302)

AJ.1

We consider these statements to be ill-founded and incorrect. Our reasons for disagreeing are presented in the following discussion, but first some general comments regarding EIR errors and contradictions are made.

Errors:

1.) Figure 2.3-1. The Tionesta siding is misplaced — AJ.2

2.) Figure 3.7-4. "Vegetation resources along proposed transmission line route segment C1." This shows the vegetation opposite much of the populated Tionesta area to be big sagebrush scrub and opposite the remaining populated area to be northern juniper woodland. (Section 16 of Township 44N Range 6E). In fact, much of the southern part of the study corridor is ponderosa pine forest. This makes one wonder what else did the study team miss if it could not see the pines within this part of the study corridor. By way of contrast in alternative C2, the study team was able to find a variety of small, special status plants within a small pocket at the edge of the corridor. — AJ.3

3.) Figure 3.9-1 and –2. The scales are incorrect. — AJ.4

4.) Figure 4.9-4. Caption for the bottom view gives wrong location. It should be Route 97, not Schochin Butte. — AJ.5

5.) Table 3.9-2. It states for segment C1 that Existing Scenic Integrity ,is moderate to low due to ranch development, numerous roads, railroad tracks, and existing transmission lines that dominate the otherwise undisturbed landscape. This statement is incorrect in part and far too broad. First, we are not aware of such ranch development in the sense of what would normally be understood as a ranch. Second, many of the residents of Tionesta consider the existing scenic integrity from their viewpoints to be excellent. Most see no roads other than the road to their residence (County Road 97A). None of the residents can see railroad tracks. Some see no transmission lines and the remainder see only the tops of one. In fact, most of us chose to live here because of the pastoral setting, the natural beauty of the immediate area and the abundant wildlife. — AJ.6

6.) Page 3-208. It is stated that approximately 15 homes are located in Tionesta and that property values of these homes range from $50,000 - $60,000. This is a low estimate of the number of homes. The property values are way off. The upper limit is low by a factor of 3 to 5, depending upon appraisal approach. This housing and lodging summary fails to note that there are two RV parks in Tionesta. — AJ.7

7.) Table D-3 states that the transmission line would be "viewed through sparse pines against land and sky backdrop". While this may be true at select locations along this length of line, it incorrectly describes the situation for other points along this segment. — AJ.8

Because we have not thoroughly reviewed the entire report and because we are not familiar with the detail of much of the environmental analysis and modeling methodology, we have probably identified but a small portion of the errors. Never-the-less, those errors we have identified suggest that the study was not very careful in some regards.

Lack of Consideration of Citizen Concerns:

1.) It was made clear to the lead agencies at the scoping sessions that we Tionesta residents were concerned about the adverse effects of the transmission line on our views. (See newspaper article in Appendix B entitled "Proposal for power plant gets yeas, nays".) Agencies were expressly invited at the scoping session to visit a resident so as to examine the view. No one contacted us to explore and better understand our concerns. In contrast, as listed in the EIR, many meetings and interchanges were held with government agencies and Indian groups to explore their concerns. (Table 6.2 lists 12 Indian contacts, about 20 government contacts and zero private citizen contacts.) It appears that travelers, transients and far-distant Indians who can only be briefly affected are given much greater consideration than citizen residents who are permanently and significantly affected.

2.) Computer simulations of the visual impact of the transmission line were made for several KOPs (key observation points). A Tionesta point was not selected, in spite of the fact that visual impact on Tionesta was known to be of concern and in spite of the fact that the visual impact at Tionesta is on the foreground (closeup) view, not the middleground or background view as for other locations simulated. AJ.9

Contradictory Statements:

It is explicitly and unequivocally stated or implied in several places in the EIR that transmission lines significantly degrade the scenic view. For example:

".....the overall sense of intactness is moderate to low. This is caused by evident land uses that include... transmission line corridors..." (Pg3-124)

"Existing Scenic Integrity is moderate to low due to ... and existing transmission lines that are scattered throughout the otherwise undisturbed landscape." (Table3.9-2)

It is later stated in direct contradiction that the presence of a visible transmission line would not degrade the view. AJ.10

" ... because of the presence of the moderate forest cover of ponderosa pine and junipers, the presence of the proposed line would not substantially alter the intactness of the landscape character as perceived from Tionesta or in the greater Modoc Plateau." (Pg 4-69) (Table 4.9-1 lists the transmission line as visible from Tionesta.)

"At Tionesta, a portion of segment C1 of the transmission line would be visible. .... The proposed transmission line would not be expected to be visually prominent in the landscape around Tionesta and would not significantly affect views from Tionesta. (Pg 4-302)

The best explanation of this apparent contradiction might be that the presence of several transmission lines in the background has significant adverse affect, but the addition of just one in the foreground doesn't. We can't buy such an argument!

Management plan ignored:

The management plan for utility corridors states "Minimize proliferation of separate utility corridors by confining future needs to existing corridors, if possible". (See page 3-144.) The proposed line (Alternative 1) ignores this standard. This raises the question of why management plans are developed if they are not going to be followed. While the EIR does not appear to address this issue, it is stated on page 4-181 that the "transmission line would not conflict with any management objectives...". This conclusion appears unjustified! AJ.11

A recently proposed amendment to the standard implies that impacts of utility corridors on associated communities and private lands are to be fully considered. (See page 1 of Modoc Record dated July 24, 1997.) While this amendment has not yet been adopted, it should be kept in mind. If it is to be followed, it would seem that there must be some substantial information interchange and discussion between the community and the agencies. As stated previously in this letter, such interchange has not occurred in the present case. AJ.12

Visual Impact at Tionesta:

The residences at Tionesta are stretched generally east to west over a distance slightly in excess of a mile. The northern property boundaries lie about a quarter of a mile south of the proposed transmission line. Thus the transmission line lies within what would be considered the foreground.

The present view and the impact of the proposed transmission line vary significantly in their character from one end of Tionesta to the other. At the west end, homes are close to Forest Service Road 97. The EIR statement on page 4-169 indicating the presence of a moderate forest cover is incorrect. The view to the North is principally brush land in the foreground with juniper trees in the background. The proposed transmission line would lie across Road 97 and would be well in front of the juniper background. Very little screening would be afforded by the intervening vegetation. Thus the poles and conductors would be in virtually full view and would be visually very prominent. AJ.13

The VQO (visual quality objective) listed for this segment of the line is "Partial Retention"(See Figure 3.9-2). With this objective, activities "must remain visually subordinate to the characteristic landscape". It hardly seems that this objective is satisfied when the transmission line would be the focus of attention in the foreground. On the contrary, it seems that this objective would not be met. Furthermore, it would seem that it must be concluded that the transmission line has a significant adverse effect on visual quality in this area of Tionesta! AJ.14

Along the center and at the east end of Tionesta, there are varying amounts of pines. These trees will afford some screening of the transmission line, but this screening will not be complete. While the transmission line will not be as AJ.15

apparent from this part of Tionesta, the impact will still be significant. This is because the present view is considered excellent. The views from this area are not presently spoiled by a host of objectionable features, as listed in the EIR.

The proposed transmission line would have some additional adverse effects in this area. The extent of the forest is thin along parts of this zone. The proposed transmission line will lie between the homes and the road (FS 97). Thus, clearing of trees and other vegetation for the line may result in views of road traffic and increased noise from road traffic. AJ.16

Alternatives:

Some potentially superior alternatives have been discarded with little more than a wave of the hand. These alternatives should be given serious consideration. The following two alternatives, in particular, warrant analysis.

A transmission line running south of Timber Mountain was proposed as an option, but the option was discarded in part because it ran through the Damon Butte "roadless release area"(page 2-74). This reasoning seems totally inconsistent with the conclusions drawn for the proposed routing. The proposed route passes through the Mount Hoffman roadless release area. The EIR concludes that the transmission line would not substantially alter the character of the roadless release area. If the roadless release area issue is essentially a non-issue for the proposed routing (which we consider to be through a more sensitive area), how can this issue be used to justify dropping the route south of Timber Mountain from consideration? We believe the south routing should receive a thorough investigation! AJ.17

The possibility of a tie-in to a 500 kv transmission line was also discarded. In this case, increased cost was the justification. However, no quantitative estimate of overall cost impact was provided; instead, it was simply stated that a 500 kv line would be 2 to 5 times as expensive as a 230 kv line and that a 230/500kv Substation would be 10 times as costly as a 230 kv station. These statements raise a number of questions What are these costs relative to the overall project cost?. How much would be saved by shortening transmission line length? How might any additional construction costs be offset by the increased efficiency (lower transmission power losses) of a shorter transmission line or of a higher voltage line? The environmental advantages of a shorter line are numerous. We believe they are sufficient to at least thoroughly analyze this possibility! AJ.18

Concluding Remarks:

We citizens of Tionesta support geothermal power development in the vicinity of Medicine Lake, but we are opposed to the routing of a high voltage transmission line close to our residences and businesses. With so broad an area to pass through, it would not seem necessary to aim the route so close to the only fulltime residential community! AJ.19

We strongly encourage you to select an alternate routing. If none of the studied alternatives appears attractive to you, we strongly encourage you to analyze some different alternatives

Tionesta Residents:

Paul J. Molder

Sharon L. Molder

Letter AK

September 26, 1997

Randall Sharp Project Leader
Modoc National Forest
800 West 12th street
Alturas, CA 96101

Re: Fourmile Hill/Telephone Flat Projects

Dear Sir:

I am sorry to be delayed in sending this in to you but I was ill and not able to do so on time. So for what it is worth I would like to express my concerns.
We have the technology to use alternate forms of energy which do not require devastating our sacred lands. When you consider this project I respectfully request that you consider your grandchildren's grandchildren. It is true that what we do now is the legacy that we leave for our future. We become the ancestors who did the thus and so's. AK.1
This power to be generated is to be sold to Oregon and will infringe on the religious practices of Native Americans. I do not understand. We would never consider descecrating a cathedral but we have no qualm with destroying a many century 's old forest which is one and the same to some folks. AK.2
CalEnergy and CalPine want to construct a geothermal power plant in the Medicine Lake Highlands. 18 acre power plant acres of well sites over 20 miles of 120 foot electrical towers not to mention all the new roads which would be needed. Imagine suggesting this for the Vatican. My intension is not to be profane but sometimes I wonder when we will wake up. Are our grandchildren going to have to watch documentary videos to see what it was like???? We have a responsibility to act responsible here and now and I am hopeful that you will make the choice which reflects the highest well being for us all. AK.3
Thank you for your consideration.
Respectully submitted,

Wise Earth Council
at 8828 Sun Valley Road
Palo Cedro, CA 96073

Wise Earth Council

CC: Senator Boxer
Senator Feinstein

Letter AL

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Barbara J Allen
Address: 9216 Rocky Rd
Weed, CA 96094
Phone: 916-938-2706

Comments: I am strongly opposed to the Medicine Lake Geothermal project. AL.1
~~In all of the information I have acquired I have not read or heard one~~ AL.2
word telling me that this project is necessary.
To develop more power, they say. For whom? // I am not willing AL.3
~~to sacrifice our natural treasure, Medicine Lake Highlands, so that a~~
few can make a few dollars.
How about trying a little conservation of our resources before AL.4
~~destroying another priceless area. Let's begin to control progress~~
and growth before we are driven to commit irreversable mistakes.

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter AM

September 14, 1997

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th St.
Alturas, CA 96101

Dear Mr. Sharp,

I am writing to urge you not to proceed with the CalEnergy and CalPine geothermal projects in the Medicine Lake Highlands. This magnificent country needs protection from any commercial development both for its biodiversity, old growth forest, and endangered species habitat as well as its importance to several Native American tribes. Please do what you can to stop these proposed projects. AM.1

Sincerely,

Clifford E. Anderson

Clifford E. Anderson
2514 N ST.
Sacramento, CA 95816

Letter AN

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: John Aquila
Address: 214 Shasta Avenue
Mount Shasta, CA 96067
Phone: 916-926-2539

Comments: I am against any of your Geothermal projects in or near the Medicine Lake Highlands. AN.1 // You people have not given any consideration to the property values in the basin at all. AN.2 // Most of us have put a lot of time, work and money into our cabins and property up there so we have a place to relax, fish, boat and enjoy the beauty and wildlife of the area. We want our children and grandchildren to be able to use the area and enjoy it for years to come. Not to listen to drilling and turbines running 24 hours a day. AN.3 // The devastation from new roads, power lines and pipe lines is enough to make a person sick at the thought. All for the almighty dollar for big business to tear up more of the land. "Public Land"? AN.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter AO

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Mildred J. Aquila
Address: 214 Shasta Ave
Mount Shasta, CA 96067
Phone: 916-926-2539

Comments: Dear M. Sharp:

After attending four (4) of your scoping meetings, I am more than ever against any geothermal development in the Medicine Lake Highlands. There are just too many "I don't Knows" and "It's in the book" // but there are a lot of people that did not have a copy of the EIR/EIS and most of the ones that now have it had to call and ask for it // We keep hearing that the steam releases only have 2% of this and that, but never has the accumulation of all the plants over a 45 year term ever been mentioned // There are so many small animals that feed off the grasses and brush and the chemicals have to effect them, as well as the eagles and other birds in the area. What will this do to the deer and elk? No one seems to care. // Why is this one called the "Four Mile Hill" project when it is not down at Four Mile Hill?

I am still in a state of shock and disbelief that the USFS, BLM and our County Supervisors, the "Caretakers of the public lands" would have ever given the slightest consideration to any of these projects.

AO.1 AO.2 AO.3 AO.4 AO.5 AO.6

cc: Joan Smith, Supervisor

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter AP

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Ashalyn
Address: 554 Everitt Mem. Hwy.
Mt. Shasta, CA 96067
Phone: (916) 926-6023

Comments: Please DO NOT allow the Fourmile High Geothermal Project to be built — with or without mitigations. The Medicine Lake area is a very valuable piece of real estate just as it sits, in its natural state. It's appreciated & enjoyed by thousands of nature enthusiasts, hunters, & those seeking quiet, pristine, natural places for spiritual retreat and meditation. It also contains several sacred Native American sites.

The developers are underplaying its effects on the environment. A project of this kind would eliminate many of the present reasons for visiting Medicine Lake, not to mention what it would do to the natural animal habitat.

I'm all for creating alternative sources of power, but NOT at the expense of the environment. Please stop this project now.

Thank you very much,
Ashalyn

AP.1 AP.2 AP.3 AP.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Barbara J. Barr
Address: 1409 Highland Dr.
Mt Shasta
Phone: 9264967

Comments: Before we irreparably disturb a pristine area, I would ask - is this new source of power really needed? Or is it motivated by some one or some group looking to make money? // If more power is required, I suggest two alternatives: 1) assessment of conservation methods, how to cut waste already existing, and 2) solar development. The sun gives it's power freely and abundantly, without the need for destroying the quality of air, water, peace and integrity of the Medicine Lake area. A lot of time, money and human energy has been put into researching this project and complying with the laws governing the process. If this much energy was channelled into solar technology and into making it easily accessable and affordable, there would be more than enough energy available to all. // The earth is a living breathing entity who has been very patient with human disrespect and destruction of her body. Her patience is running short. How much more will she take before shaking us off like water off a dog?! I'm not joking - this is real. AQ.1 AQ.2 AQ.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: MARCIA BARROW
Address: 7411 SUGAR PINE RD.
WEED, CA. 96094
Phone: 916 938-2388

Comments: I am against the construction of the Fourmile Geothermal plant for the following reasons:
1. This is a pristine area which will undergo adverse impacts on wild life. It will alter migration routes for Black Tail Deer and Black Bear. The wellheads and plant site plus the transmission line routes will heavily impact endangered species and other sensitive species such as Bald + Golden Eagles, Blue Grouse, Coopers Hawk, Goshawk, Spotted owl, Osprey, Pileated Woodpecker, several species of Bats, plus Marten and Snow Shoe Hare. See EIR table 3.8-2. I might add that just because some species weren't spotted doesn't mean they're not there. If the habitat is right, they will be there. I lived in this area for 2½ years before I saw a Black Bear. AR.1
2. You have not addressed the total impact of 6 plants, not just Fourmile and Telephone Flats, at an average of 640 acres per plant (not counting transmission lines) that comes to a total of 3,840 acres. AR.2
3. A test well has not been drilled for Fourmile which is AR.3 one

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

required by law and may very well be illegal, which puts the whole project under suspicion.

4. a transmission line between Medicine Lake and the Glass Flow is NOT ACCEPTIBLE AT ALL! It just proves that Cal-Pine is only interested in profits and is taking the cheapest way out. How many of the required mitigations will they follow in such a remote area when they think no one is watching? AR.4

5. The EIR section 4.21 states there will be irreversible environmental changes of non renewable resources. also the danger of trucking hazardous materials, well blow outs (1 in 1984 on a test well) and emissions from accidents and improper handling AR.5

6. The EIR section 4.19 states there will be unavoidable effects ranging from removal of habitat, plant emissions and impacts on cultural values. Read your own EIR before you tell us "no problem."

There will be a disproportionate effect on low income and minority people. For 350 years the White man has murdered native Americans, stolen their lands, denied them their freedom, culture, language and religion. Its disappointing to see that the Federal Government is still at it. There is no area on the Medicine Lake Highlands that the Geothermal projects won't adversely impact native American Religious sites. The only way to avoid this is Alternative 7. AR.6

Siskiyou County may be the most sparsely settled county in California, but we are passionate ~~ab~~ about our Wilderness areas and the rights of our people. This land belongs to us and you no longer have the right to sell it and our heritage.

The B.L.M. and Forest Service have lost sight of what their true function should be; which is the protection of our forests, streams and wildlife and not the marketing of it. AR.7

We, the citizens of Siskiyon County will do everything legal at our disposal to block any and all further development in the Medicine Lake Highlands.

Respectfully
Marcia L. Banor

Letter AS

Brian B. Beard

25 FERNWOOD DRIVE
SAN ANSELMO, CA 94960
415/453-1775

GENERAL CONTRACTOR
LIC. NO. B-673323

September 15, 1997

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, Ca 96101

RE: Geothermal Energy Development In The Medicine Lake Highlands

Dear Mr. Sharp:

Please include this letter in the planning process for the geothermal energy development proposed by CalEnergy and CalPine.

I support wilderness designation for both the Mount Hoffman and Burnt Lava Flow Roadless Areas. AS.1 The large and diverse population of raptors frequenting this area require large expanses of unbroken old growth forest. The cutting of many acres of timber and associated support structures including roads will negatively affect wildlife populations of this ecologically important region. AS.2

As you are undoubetely aware President Clinton has designated an old growth reserve in this area as part of his Northwest Forest Plan. Please send a map or written description of the boundaries of this old growth reserve, with an overlay of proposed energy developments and associated facilities. AS.3

During the planning process please take action to insure that the natural and pristine qualities of this region are not degraded. I am opposed to energy development that would negatively impact the old growth forests and associated wildlife populations. AS.4

Thank you for your time and considerations; please add my name to your mailing list concerning energy development in the Medicine Lake Highlands. I look forward to receiving the above requested map. AS.5

Sincerely,

Brian B. Beard

Letter AT

September 29, 1997
10025 Burley Drive
Weed, CA 96094

Modoc National Forest
Alturus, California

Re: Medicine Lake Geothermal Project

Many people have stated their objections to this project on the basis of the negative impacts upon the wildlife, including threatened animals, and recreational amenities. We concur with these concerns, therefore, we will not repeat these environmental issues. AT.1

It was our understanding at the tour conducted for the benefit of the Siskiyou County supervisors at Medicine Lake the first management priority for the Medicine Lake Recreational Area was in fact, recreation. We urge you give considerable weight to this value and place this project on hold for an indefinite period of time, at least until there is clearly a need for additional unsubsidized power generation. AT.2 As taxpayers, we object to paying for any more subsidized projects. The profit potential, without government subsidy, is very, very low. To subsidize this project in order for the county of Siskiyou to derive some "income" is an illusion - we still pay for it, and so do each of you. AT.3

Thank you for your consideration of this matter.

Kenneth Beatty
Kenneth Beatty, Ph.D, Biology

Lenna Beatty
Lenna Beatty

Letter AU

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~29~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Jackie Bennetts
Address: 420 Buckeye Terrace #2
Redding, Ca 96003
Phone: 242-1020 I oppose:

Comments: Because it will desecrate the wilderness AU.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

FROM THE DESK OF
DAVE and LAURIE BISH
1637 CESSNA COURT REDDING, CA 96001
(916) 246-2877

Letter AV

September 16, 1997

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

RE: Fourmile Hill/Telephone Flat Projects

Dear Mr. Sharp:

I am writing to ask that you deny the request from CalEnergy and CalPine to build the geothermal Project referenced above. AV.1

This proposed project will substantially degrade a pristine area with significant old-growth forests and endangered species, including both the northern and California spotted owl. This area has been designated an old-growth reserve as part of President Clinton's Northwest Forest Plan. Additionally, the area is of cultural import to numerous Native American tribes. The area serves an attractive location for wilderness travelers which will be blighted by the electrical towers. AV.2 AV.3 AV.4

The worst impact of the project is that the resulting power will be sold out of state while the negative ramifications will remain with California. AV.5

Please stop this unneeded project now. AV.6

If you have any questions, please give me a call.

Thank you very much.

Sincerely,

David A. Bish

Cc: The Honorable Barbara Boxer
Senate Office Building
Washington, DC 20510

The Honorable Diane Feinstein
Senate Office Building
Washington, DC 20510

Letter AW

Please read the Enclosed

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: BLAKENEY – MARIAN – JACK BROWNELL B –
Address: 2302 TOWN CENTER DR.
KLAMATH FALLS OR – 97601 (Property owner)
Phone: 541-885-9686

Comments: These are comments of both Myson & Me –
M. Blakeney – J B BLAKENEY
Having attended Meetings this summer held at the Shiloh Inn – both of us feel very definitely that this project is in no way constructive. There are so few pristine areas left for us to enjoy – For Example – Our National Parks are all being noticed as polluted – overseen and and are costing Millions of dollars to remedy and repair – AW.1
Not in favor of #1 Plan – AW.2
NOTE Not in favor of destroying the Hot Spot on Glass Mtn AND AW.3
WHY destroy the Caldera ??!! AW.4
– I Marian Brownell Blakeney have spent Many Many years since early 1920's loving & enjoying this Unique and beautiful country – Please don't destroy it! Sincerely, AW.5
Marian B. Blakeney

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Geo-heat projects threat to Medicine Lake area

BY JERRY A. TUREK
Guest columnist

The Bureau of Land Management and the United States Forest Service are the lead agencies in promoting the latest geothermal fiasco.

They have leased property to CalEnergy and CalPine which are proposing to build geothermal power plants in the Medicine Lake Highlands. This is California's largest volcanic area and is located in eastern Siskiyou County in the Shasta Trinity and Modoc national forests.

CalEnergy's Telephone Flat geothermal project is 1.5 miles east of Medicine Lake and actually lies within the volcanic caldera.

CalPine's Four Mile Hill geothermal project is located three miles north of the lake on the outside slope of the caldera just south of the Lava Beds National Monument.

We feel strongly that the location of these projects is in an area that poses serious geophysical risks. Could geothermal drilling trigger the volcanic activity that already exists?

The pristine Medicine Lake area is not only a popular recreational spot for campers and fishermen, it is also home to abundant wildlife, including bald eagles and osprey, which nest along the lake shore.

Medicine Lake has a long historic Native American heritage and several local tribes including the Modoc, Klamath and Pitt River Indians have sacred ceremonial sites there.

The development of this project would result in the construction of an 18-acre power plant site, four miles of above-ground 36-inch-diameter steam pipelines, acres of well sites and over 20 miles of 120-foot towers that support the high-voltage transmission lines.

It would be necessary that many new roads be built to connect and maintain the entire system.

There would be 18 to 22 geothermal production and injection wells drilled for the first CalEnergy power plant. It would take 45 to 90 days of around-the-clock drilling for one well that will be 3,000 to 6,000 feet deep.

Drilling will only be curtailed during heavy winter snow months. The constant noise made by the drilling will not only be extremely disruptive to humans, but to the natural wildlife of the area.

The negative impact on the environment, the flora and fauna, the geology, the Native American ceremonial sites and recreation, will change the face of the Medicine Lake Highlands forever.

The $100 million cost for the construction of the 48-megawatt CalEnergy Telephone Flat project is not cost effective. It is difficult to believe that a 48-megawatt power plant can generate enough income to pay off the construction and maintenance costs during the reasonable life of the facility.

With power plants all over the western United States shutting down and with the onset of deregulation of electricity, we question the wisdom of these major new geothermal projects. We feel that the CalPine Four Mile Hill project will be no more cost effective or efficient.

We would also like to underscore the fact that the power generated will not benefit the citizens of California who will be paying the price with the environmental destruction of this pristine and unique area. The power will be sold to Oregon. It is obvious that the intent is to take the natural resources put in trust for the people and sell them for a price to the highest bidder.

In the current political climate when the public is especially concerned about threats to the environment, we ask why geothermal development now? The geothermal potential of this area has been known since at least 1981. The cost effectiveness of this project is certainly questionable. The environmental and ecological costs are not.

This development will be extremely costly to the locality and to all life currently living in or using this area.

We feel this project is being promoted now as a scheme to generate money for the Bureau of Land Management and the Forest Service.

Budget cuts affecting these agencies are well known. If you follow the money trail, they are the ones who will be receiving the cash.

The locations of these project are on public lands.

These agencies are supposed to manage and protect these areas for the public good instead BLM and the Forest Service will desecrate this area to enhance their own coffers in complete and utter disregard of the public trust.

The author

Jerry A. Turek is writing on behalf of Medicine Lake Citizens for a Quality Environment, P.O. Box 34, Mt. Shasta, Calif., 96067.

Letter AX

October 8, 1997

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
USFS
800 W 12th Street
Alturas, CA 96101

Greetings:

I just took a drive up to Alturas this past Saturday. What magnificent country you reside in. It feels as if it becomes a bit remote during the winter months because of the distance in from Redding.

Awhile back I took a drive up to TuleLake to view the Eagles and at another time to see all the mother ducks with their hatchlings following them in a line. Nature :>)

I recently read of the proposed GEOTHERMAL project a t Medicine Lake and thought this won't come to pass. It would be like going into a national cathedral and deciding to drill because it would be profitable. We would never allow that to happen and yet when it comes to our Natural Resource Treasury we seem to be quite asleep. Please ensure the safety and well being of this land you are entrusted with. 100 million dollars to construct the 48 megawatt CalEnergy Telephone Flat Project is simply not cost effective//California will pay the environmental destruction costs and Oregon will receive the energy that will be produced???? What is wrong with this picture?//The Fourmile Hill Project has no buyer for its proposed electricity. We are closing down plants all over the state because they are no longer profitable to PGE. And now we are going to make more mistakes in allowing the building of new ones on pristine lands :>(. I don't understand.

Please do sell this in order to generate funds for the BLM and FS. Go to the public and let them know you need greater funding and watch the taxpayers speak out in behalf of protecting the land. It is our heritage to our grandchildren. Of course we are willing to protect it. We just need to be informed.

Respectfully submitted,
Susan Bradfield
8828 Sun Valley Rd
Palo Cedro CA 96073

AX.1

AX.2

AX.3

AX.4

Letter AY

9-16-97
21721 Septo St #120
Chatsworth CA 91311

Randall Sharp, Project leader
Re: Fourmile Hill/Telephone Flats Project
Modoc National Forests
800 West 12th St.
Alturas, CA 96101

Dear Mr. Sharp:

Please withdraw your requests to do the CalEnergy and CalPine projects in the Medicine Lake Highlands of Modoc National Forest. AY.1

As you know, President Clinton designated this area as an old growth reserve as part of his Northwest Forest Plan. This was because of its extensive forest and biodiversity. The highlands are home to the bald eagle, osprey, American marten, goshawk, peregrine falcon, pileated woodpecker and northern spotted owl and California spotted owl. AY.2

The land is sacred to the Pit, Klamath, Modoc, and Shasta tribes of American Indians. Many ceremonial sites are located on this property. AY.3

As you know, forests are natural water purifiers. This forest provides water year round to the people of this region. It provides much of their water. AY.4

Thank you for your careful consideration of this matter.

Sincerely
Theresa Bradl

CC: Boxer

Letter AZ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Anne L Brightwell
Address: 9230 Davis Place Rd
Mt Shasta, Ca 96067
Phone: (916) 926 3850

Comments: My personal opinion regarding the geothermal development in the Medicine Lake area is another disaster to our environment. Why keep destroying our federal & state parks, along with beautiful pristine areas throughout our country for the damned almighty dollar. We have an overabundance of geothermal plant throughout this country, we don't need any more. Some ~~the~~ geothermal plants have even closed down because their power isn't needed. I have spent many wonderful days in the Medicine Lake area and I can not imagine allowing its destruction. I hope it can be stopped. The people in the good old USA have got to get involved in keeping this kind of developments from happening. Too bad the property owners in the Medicine Lake area didn't take action when it was known that a geothermal project was in the making eight years ago. I wish them well at this late date, but I'll be happy to join them in stopping the Fourmile Hill Project and any others to follow. This land belongs to all of us, let's keep it that way. God help us. AZ.1 AZ.2 AZ.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BA

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

Ve value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ubmit any comments at the close of the public hearing or send comments by September 16, 1997 o the address listed at the bottom of the page.

Your Name: Kevin Brooks
Address: 1032 N. ms Blvd
mt Shasta Ca 96067
Phone: 916 926-6190

Comments: Day in and day out we the people suffer thru more and land closers and boundary changes, as one and innumerable I can force the inmates closer of these areas to the winter recreationalist and hunters.

I see no problem with this type of project if it didn't cause such circumstances as it will. The proven plan of giving back some of the wilderness areas that were stolen from us in the past would be the only way you'll get any support from me and the community at large. BA.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BB

9/13
Dear Mr. Sharp:

Please deny permission for CalEnergy and CalPine (and anyone else for that matter) to build a geothermal powerplant in the Medicine Lake Highlands. This project would ruin the area's ecosystems — and this is an area that deserves protection! BB.1

Thank you,
Tom Cambra
474 Green Glen Way
Mill Valley CA 94941

8-20-97

Letter BC

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Louie J. Capovilla
Address: 4305 Gray Street
Dunsmuir Calif 96025
Phone: 916-235-2360

Comments: The Fourmile Hill Geothermal Project will Distroy the Medicine Lake Area. It is a Pirtual place where wild Life, Recreation And the invironment will Be Distroyed, It Also will Affect
A Noise
B poluting the Air.
C Property Value
D Forest
E Eagles, Deer other wild Life
F possibly Affect Medicin Lake Water Level.

BC.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BD

Alan Carlton
Attorney at Law
715 Santa Ray Ave.
Oakland CA 94610
(510) 465-6152

September 15, 1997

Randall Sharp
Re: Fourmile Hill/Telephone Flat Projects
Modoc Nat'l Forest
800 West 12th St.
Alturas CA 96101

I am writing to oppose any geothermal projects at Medicine Lake Highlands. This area should be completely protected as wilderness, not commercially developed. It contains many species that need to be protected, ancient forests, and biodiversity values. Any electricy generated will only be of short-term value but the loss of the wilderness character of these lands will last forever. We don't need any more development in such areas. BD.1 BD.2

Sincerely yours,

Alan Carlton

Letter BE

PAUL & DOROTHY CARTER

1588 Center Street, Weed, CA 96094 (916) 938-1871

September 16, 1997

Randall M. Sharp, project Leader
USFS/BLM Fourmile Hill/Telephone Flat
Geothermal Development Project EIS/EIR
800 West 12th Street
Alturas, California 96101

Dear Sir:

I am writing you regarding the proposed Fourmile Hill Geothermal Project planned for the Medicine Lake area. I have attended five of your hearings, and there seem's to be more question's than answer's given to the general public. I failed to see very much support for the project. The only support I have seen is from the commercial interest's and bureaucrat's with dollar sign's in their eye's. The people proposing this project do not really know what the effect will be on the environment, or the Medicine Lake area. I feel the government agencies have mis-lead the general public by calling the project Fourmile Hill. It is not located at Fourmile Hill it is much nearer Grouse Hill. Therefore, it is much closer to Medicine Lake than the public thought, or more people would have opposed the project at the conception. I am also concerned about the piece meal approach of the proposed project's, to keep local control rather than being under State Regulations. So, after reading the Fourmile Hill Draft EIS/EIR Report. I urge all the Government Agencies to adopt alternative No. 7 , because there is to many un-answered question's regarding these projects. There need's to be a complete new EIR report showing the continual accumulation of pollution from five or six of these plant's in the Medicine Lake area. If these project's are even going to be considered in the future. There also, needs to be an extensive study on the recreational value of the Medicine Lake area. I feel it has more value to the State of California and Siskiyou County than the proposed geothermal project's, and is much safer for the environment. Any consideration you give my comments will be appreciated. Thank you.

BE.1 BE.2 BE.3 BE.4 BE.5 BE.6 BE.7 BE.8

Sincerely,

Paul Carter

Paul Carter Jr.

Letter BF

Dear Mr. Sharp; 8/20

I am writing regarding the proposed geothermal plant at Medicine Lake. I do favor development of geothermal electricity — though not at the cost of the sacred Medicine Lake site.

Please visit for yourself. Experience its pristine beauty + magical serenity. I believe you will come to believe that such a rare site must be preserved at all costs.

Aside from my own experience, the Medicine Lake area is considered sacred ground to its native inhabitants. I believe that this is reason enough to be preserved. Native Americans have had most of their sacred homes taken from them.

I plan to use the enclosed photo on the cover of my upcoming book. Medicine Lake is an extremely sacred place.

Sincerely —

JoAnne Cedar (916) 938-4638

BF.1 BF.2

Letter BG

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please omit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ur Name: Colleen Cena
ldress: 810 McCloud Ave
Mt. Shasta CA
one: 916-926-4040

omments: While I am not opposed to growth in this County and certainly do want to see it prosper economically, I believe that we sometimes have a tendancy to throw the baby out with the bath water!

By virtue of our natural beauty and recreational activities our area attracts tourists who ultimately leave their dollars on our door step. We are almost totally dependant upon tourism to maintain a healthy economy. BG.1

What is proposed at Medecine Lake is contrary to everything that makes us attractive to the outside world. Geothermal plants, pollution and health hazards are what they are running away from. We do not want this type of development in our recreation areas, nor in any other area where adjoining property values will be adversely affected.

My vote is "no way"! BG.2

you wish, you can mail your comments to:
ir. Randall Sharp
SFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
0 W. 12th Street
lturas, California 96101

Letter BH

September 22, 1997

Dear Mr.Randall Sharp

Sir, please enter into the official record my comments and suggestions regarding Fourmile Hill Geothermal Development Project. BH.1

I have a full copy of the D.R.I.S.E.I.R. and I reviewed it. I have followed this project from its beginning and been in early communication with the consulting firm in Burlingame Cal.. The consulting firm was very unprofessional in not responding to my early requests for information. I even send register mail in hope of creating a dialog. Having said this, does not make me feel better about this development. BH.2

It seems very clear to me that the Forest Service , Bonneville Power Admin. and BLM will have their way, with the PUBLICS LAND AND THE HELL WITH THE BEAUTY AND SOLITUDE OF THE MEDICINE LAKE REGION ITS WATER QUALITY and FISHERY RESOURCE. BH.3

I want to call your attention to Page one (1) of the DRISEIR "Purpose and Need" which states there is no purpose to this development. This very simply states that Calpine purpose is to develop the geothermal resource. SO, SO, SO, SO, ?????
Does The Bonneville Power Admin. need to reach into California seeking electrical energy? I don't think so. Is the economy of the northwest threatened without this small project? I don't think so. This is pure foolishness. BH.4
ECONOMICALLY and ENVIROMENTALLY this project is not necessary.
Page one (1) goes on to say that in 1970 some obscure act The US Geothermal Steam Act of1970 states a need for the project. PROVE IT . Where in the act is that stated, specifically? Pages S-8 and S-9 which show Alternatives indicate that every natural resource in the regional will be adversely effected. The most blatant arrogant show power is the total 100% acknowledgment that Medicine Lake water quality and quantity, along with a remarkable old growth forest will be ADVERSELY EFFECTED GREATER THAT PROPOSED ACTION IN TOTAL. BH.5 The DRISEIR goes on to say that the Calpine project will add significant dust and adversely effect air quality. BH.6 The Calpine project will adversely effect views of Lava National Monument. BH.7 Come you fellows are a lot more intelligent than your acting . This Calpine project is an environmental bust, its slap in the face of all Californians. Why in the hell are we sending millions in the state on air and water quality and the Forest Service , BLM and a Washington State Power company Bonneville Power come up with a plan to "do their own thing" all because of some obscure Geothermal ACT of 1970 ? BH.8
I won't even get into wildlife, Indian religious, etc,etc,etc. because it really does not matter, Calpine , CalEnergy and the federal agency have their mind made up and you believe that this project is a go. BH.9
I feel very strongly that this project is not in the best interest of The State of Californian , eviromentally or economically. I feel very strongly that is project will have a life long lasting effect on Medicine Lake its water quality it water quantity, the air quality of the region, the wildlife habitat will be impacted beyond any computer models you have Gerry BH.10

rigged. This is a very poor decision of the management team of the Modoc National Forest, it is very short sighted and smacks of special interest projects pedaling on public land//There is not pressing need for a project like this in the Modoc National Forest.// BH.11
I close with my final argument as stated on page S-5 PLEASE READ THIS !
I QUOTE "THE PLANNED PERIOD OF COMMERCIAL OPERATION IS 45 YEARS" BH.12
All this destruction for a 45 year project ??????????????? BH.13
I QUOTE again from the recent movie Jerry MACURE " SHOW ME THE MONEY"
I will make my suggestion clearly heard DO NOT APPROVE THIS PROJECT. Cancel this project for the next 45 years! Lets see if a need exist in 45 years, then per your report it will only take 3 years to implement to resource. BH.14

Sincerely
Richard S Cimino Richard S. Cimino
1281 Ridgewood Rd.
Pleasanton, Cal. 94566

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Steven L. Cook + Nancy J. Cook
Address: 234 Pony trail Dr.
Mt. Shasta, CA 96067
Phone: (916) 926-4132

Comments: Dear Sir, We are very concerned/AGAINST about the environmental effects of the Geothermal Project. ie.
1) on wildlife (Deer, Bear, Fish, Squirels etc)
2) Chemical Pollution (Sulfer etc)
3) Lines (Power thru Forested Area)
4) effects on homeowners (CABINS) etc
5) Possible Side effects on Volcanic Disturbances. BI.1

Thank You,
Steven L Cook
Nancy J Cook

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BJ

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Martin Copenhafer
Address: 18168 Kingsport Dr
Malibu, Ca 90265
Phone: 310-459-2120

Comments: (1) The Medicine Lake Highlands are one of the few truly wilderness areas left in California. Every effort should be made to preserve the area. The proposed development will forever destroy this pristine environment. BJ.1

(2) Geothermal projects have a poor track record for being economic developments. Why destroy a truly wilderness area for the remote possibility that this development may prove to be economic? Who benefits from this development other than a private developer? BJ.2

(3) At this time there is no urgent need for the power this development may produce. Other less environmentally damaging projects are more than capable of meeting our energy needs. BJ.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BK

September 15, 1997

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Re: CalEnergy and CalPine Geothermal Projects

Dear Mr. Sharp:

I am writing to express my strong opposition to the CalEnergy and CalPine geothermal power project in the Medicine Lake Highlands. BK.1 These spectacular wildlands contain extensive ancient forest and biodiversity values and were designated an old-growth reserve by President Clinton's Northwest Forest Plan. BK.2 The Medicine Lake Highlands deserves national monument status to protect its wild character. BK.3 Please stop all development. BK.4

Thank you for your attention to this important request.

Sincerely,

John Copoulos

John Copoulos
226 Page Street
San Francisco, CA 94102

cc: Senator Dianne Feinstein
Senator Barbara Boxer

Letter BL

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

/e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ibmit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997) the address listed at the bottom of the page.

our Name: CHARLENE COUSINS
.ddress: 2330 DAVIS PLACE RD
MT. SHASTA CA
hone: 916-926-6521

:omments: I was born in Dunsmuir, CA. I lived in Mt Shasta for 1½ yrs. 30 years ago. I just moved back because I love the area. I love it because of the mountains and the unspoiled natural beauty.
If we continue to allow "big money" and government agencies to encroach on our wilderness areas, how long before the whole continent looks like Los Angeles, CA??!! If that is the kind of environment you want, then move down there!! Don't allow our area to become spoiled.
Some people think if something gets broke it can always be fixed or replaced! I urge you to REMEMBER THE BUFFALO!!! BL.1

you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter BM

RHODELIO CRUZ
4150 San Pablo Dam Road #7
El Sobrante, CA 94803

15th of SEPT., 1997

Dear Mr. Randall Sharp, Project Leader:

I do not believe that it is proper to allow construction in the Medicine Lake Highlands – the Cal Pine, Cal Energy projects are ill-conceived. BM.1 Geothermal energy is not long-term, and the damage done to the rare and beautiful plants, animals and the natural habitat they need, would be illogical. Please disallow any marring of the biotic and geological landscape. BM.2
I would like this letter to go into the public record. BM.3
THANK YOU, Del

Del Cruz
4150 San Pablo Dam Rd #7
El Sobrante, CA 94803

SANTA BARBARA, CA 93102 PM 15 SEP 1997

ALWAYS USA 32 ZIP

RECEIVED SEP 18 1997 MODOC N.F. ALTURAS, CA

MR. RANDALL SHARP
PROJECT LEADER
MODOC NATIONAL FOREST
800 W. 12th STREET
ALTURAS, CA 96101

S. Peder Cuneo DVM, MJ
7040 Harold Drive
Tucson, AZ 85743-9434
(520) 579-7122

August 3, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The purpose of this letter is to express my extreme opposition to the proposed geothermal development project in the Medicine Lake basin. BN.1

I have visited the Medicine Lake area for the last 20 years. I was a practicing veterinarian in Siskiyou, Shasta and Humboldt Counties before joining the faculty at the University of Arizona, and am familiar with the fragile ecosystems of these areas. BN.2

As a scientist and concerned citizen, I am appalled that any serious consideration could be given to such a project. There is no need for the limited amount of energy generated by these plants. Further, this is not a "green project"- there are extensive environmental costs from this project.

Over the last twenty years the USFS has spent extensive amounts of time and money to develop this area as a recreation site, which I believe is the best use for this area. I understand that multiple use is the mandate for public lands, but this development will have a substantial negative impact on recreational use in the Medicine Lake basin. The limited amount of power produced from this project (located over 350 miles from major urban areas) does not fit appropriately into the multiple use doctrine of the Forest Service, and will ultimately negate the recreational value of the area. BN.3

At the University of Arizona we are constantly asked to develop sustainable agricultural systems that are economically valid. This project as proposed is NOT economically justified and will come with a high environmental cost. This is not a project I would consider to be sustainable in any manner. BN.4

In conclusion, I recommend that the "No Action" Alternative is the only choice regarding this project. BN.5 I am requesting a copy of the EIR/EIS and that I be added to your mailing list and be informed as to the progress of this project. BN.6

Thank you for your attention in this matter.

Sincerely,

S. Peder Cuneo

S. Peder Cuneo DVM, MJ

cc: Vice President Al Gore
Senator Diane Feinstein, California
Senator Barbara Boxer, California
Mr. Bruce Babbitt, Secretary of the Interior

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA

S. Peder Cuneo, D.V.M., M.S.
Veterinary Specialist, University Animal Care
Research Specialist, Department of Animal Sciences

Building 101 CAF
Tucson, Arizona 85721
(520) 621-1330
FAX (520) 621-8833
Pager/Voice Mail:
(520) 291-1993

Suzanna S. Cuneo, Esq.
7040 Harold Drive
Tucson, AZ 85743-9434
(520) 579-7122

August 3, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The purpose of this letter is to express my extreme opposition to the geothermal development project proposed near the Medicine Lake recreational area. BO.1

I have been coming to Medicine Lake for thirty five years, since I was nine years of age. I have also lived in Siskiyou, Shasta and Humboldt Counties and am very familiar with the diverse and pristine forests and lakes of the region. Finally, I am an attorney, licensed in both California and Arizona. While living in Humboldt County, I practiced land use planning law for the County and reviewed numerous EIR's. BO.2

In reviewing articles written about the proposed project, it is clear that all of the proposed actions, other than the no alternative action, will cause major adverse effects to the environment, water quality and wildlife of the region. It is also clear that the project is not necessary because there is no need for the power and the cost of the product will not be competitive given todays energy market. BO.3

Finally, the current recommended site will significantly impact on the quality of the recreation at Medicine Lake which is the use the land should be protected for. The Forest Service has spent significant amounts of public money developing recreation in the Medicine Lake area over the past 20 years (including a boat dock launching area, access and campgrounds, and a snowmobile staging area with a large warming hut). Recreation should be the focus of this area, not energy development. BO.4

While I agree that public lands should be put to multiple uses where appropriate and that we need to pursue clean sources of power wherever environmentally and economically feasible, this proposed project in the pristine Medicine Lake area given the documented adverse impacts and lack of economic need, simply MAKES NO SENSE! In short, the No Action Alternative is the only reasonable recommendation at this time. BO.5

Please provide a response to the concerns raised in this letter and advise as to the results of the public hearing process. My family intends to follow this project closely, communicate with our legislators and the Sierra Club and consider appropriate legal action if the project is approved and permits issued. BO.6

Sincerely,

Sue Cuneo
Suzanna S. Cuneo, Esq.
CA State Bar #84299

cc: Vice President Al Gore
Senator Diane Feinstein, California
Senator Barbara Boxer, California
Mr. Bruce Babbitt, Secretary of the Interior

Letter BP

Suzanna S. Cuneo and S. Peder Cuneo
7040 N. Harold Dr.
Tucson AZ, 85743-9343
fax 520-318-7159

September 15, 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street, Alturas CA 96101

Dear Mr. Sharp:

This letter is written as a follow up to the public hearing regarding the Fourmile Hill Geothermal Development Project ("the project") of August 30, 1997; the Board of Supervisors Project tour of Sept. 3, 1997 and my conversation with you on September 9, 1997 during which you advised me (Suzanna S. Cuneo) that the public comment period for the draft EIS/EIR had been extended to Sept. 30, 1997 rather than Oct. 31, 1997, the date requested by the taxpayers who attended the August 30, 1997 hearing at Medicine Lake. The purpose of this letter is two fold. The first is to request that the public comment period regarding the draft EIS/EIR for the project be extended to December 31, 1997 for the reasons specified below. Secondly, it is to provide general comments regarding the proposed project. Detailed comments and concerns about the draft EIS/EIR will be sent in a subsequent letter. Additional requests for public documents relevant to the preparation of the draft EIS/EIR may also be made as that document is reviewed in detail. BP.1

I REQUEST TO EXTEND THE PUBLIC COMMENT PERIOD TO DECEMBER 31, 1997

Please consider this a formal request to extend the public comment period on the draft EIS/EIR to December 31, 1997 for the following reasons.

1) Lack of Economic Feasibility Study BP.2

At the August 30th public hearing, a request was made that the economic feasibility study required by the California Environmental Quality Act (CEQA) be provided to the Medicine Lake Homeowners group. This study is a public record and subject to the Federal Freedom of Information Act (FOIA). **This study has not been provided.**

The study is extremely important in the environmental review process because one primary issue is whether the economic need for the project justifies the associated

environmental impacts. The information presented by the environmental consultants, the Calpine environmental representative and yourself at the August 30th public hearing and the September 3rd Board project tour indicated there was no demonstrated need for the electricity generated by the project at this time. The draft EIS/EIR does not document a specific need (of course only ¾ of a single page even discusses the "need" for the project. The other remaining 800+ pages describe the environmental impacts).

At the August 30th public hearing and Sept. 3rd Board tour, the Calpine representative admitted that the cost of producing power from this project would be twice the current market rate. Calpine also stated that the company had **no current buyer** for the power generated by this project; specifically that they had no commitment from BPA. This is significant because the purpose and need section of the draft EIS/EIR focuses on the "need to economically produce and deliver electrical energy to BPA and others . . . " (Draft EIS/EIR; 1-3).

In addition, at the Sept 3rd Board tour, the Calpine representative stated that Calpine had not even determined if a viable geothermal power source exists within the proposed project area because they had not completed test drilling. This fact is also stated in the EIS/EIR (pg. 2-38). Calpine also stated that if after preliminary drilling was completed and the company was unable to find a geothermal power source, the remainder of the project would be abandoned. Given this scenario we are appalled, as taxpayers, that the USFS has spent this amount of time and effort on this "maybe" project.

When asked about the bond that Calpine would be required to post for the project we were informed that the bond amount would be $100,000. Given the size of this project such a small bond would do very little to mitigate the effects of a major environmental disaster. So, one big question remains, who will pay for the clean up if a major accident were to occur-the answer is the taxpayer.

At the August 30th hearing you were unable to provide the amount of the annual lease payments being paid annually by Calpine and Cal Energy for their lease sites in the Medicine Lake area. Yet you had an extensive amount of information about *potential* royalties that could be generated by this project. At the end of the August 30th hearing you stated that you would provide that information to me, about current lease payments after the meeting. That information has not been provided.

At the hearing and Board tour there was discussion that Siskiyou County and the Federal Government would receive millions of dollars annually from taxes and royalties generated by the project. How are these millions generated? From the taxpayers? Please provide the Economic Feasibility Study within 10 working days of receipt of this letter.

2) Lack of Compliance with FOIA

a) The Medicine Lake Homeowners group made several requests for public documents in July 1997. Many of these documents still have not been provided. They

are all necessary to evaluate and provide detailed comments to the draft EIS/EIR.

b) Dan Spencer and Peder Cuneo sent letters in early August requesting copies of the draft EIS/EIR. Neither received the draft EIS/EIR as a result of those letters. Those of us that did receive the document received it on September 5, 1997, as a result of the August 30th hearing. Dan Spencer has still not received it. As this document is in excess of 800 pages, significant additional time must be provided to allow thorough review and comment.

3)Request for Additional Public Documents Pursuant to FOIA

Please consider this a formal request for the following public documents related to the proposed project:

-the entire project file including Calpine's permit applications;
-all project reports submitted by agencies providing input on the project or the environmental review process; (specifically reports by U.S. Fish and Wildlife and California Fish and Game pertaining to impacts on wildlife and threatened species)
-all public comments;
-all transcripts from public hearings held during the scoping process;
-a copy of any draft-proposed permit for the project;
-a copy of the entire project file for Cal Energy's proposed Telephone Flat project, including all of the above described items;
-a copy of all prior environmental documents considered in developing the draft EIS/EIR for this project
-a copy of all relevant Klamath and Modoc Natl. Forest plans for the area including any correspondence with the Park Service regarding the impact for the Lava Beds Natl. Monument and development of the Scenic Corridor (see draft EIS/EIR page 1-5 for specific reference)
-a copy of the regulations covering administrative appeals;

Please provide all of the documents within 10 days pursuant to FOIA requirements. If there is a cost with providing these documents please notify us by telephone (520-621-1330 [office]) or by letter. This request will be followed up by telephone calls a week after this letter has been posted.

II GENERAL COMMENTS REGARDING THE PROJECT

1) There is no documented economic need for the power generated by the project and the environmental impacts will be significant and permanent. BP.3

No information has been presented which documents the economic need for the project. As stated above, the information presented showed the opposite; that there is no need for this project. At best this project is premature. At the public hearings Calpine stated that the cost of producing the geothermal power would be twice the current market

rate; that Calpine does not have a buyer (BPA has made no commitments) and Calpine does not know if there is a viable geothermal resource because they have not completed exploratory drilling.

The only possible rationale for pushing this project is so Calpine is able to "beat out" Cal Energy's Telephone Flat proposed project and thereby escape a complete environmental review of the cumulative impacts to the entire Medicine Lake area as the result of the development of geothermal power. The other reason for the rush is that BPA may be trying to "clean up their negative public image" by getting into "the green power business." Of course that would be without advising the public that "green power" will be obtained by devastating a pristine and unique recreational wilderness area at taxpayer expense. The "need" for the project must be evaluated not only in terms of green power but in terms of the loss of hundreds of thousands of dollars already invested to develop recreation at Medicine Lake and the loss of future monies and enjoyment by the taxpaying public when recreation uses (hunting, camping, fishing and snowmobiling) have been permanently impaired by the negative impacts of the project.

2) Adequate Notice of the Public Scoping Process Was Not Provided to Affected Interested Parties

This proposed project will significantly impact Federal public recreational lands, supported by taxpayer's dollars. Notice of the public scoping process and the draft EIS/EIR was not properly provided to those who use these lands. First, most of the Medicine Lake homeowners were unaware of the scoping process and most had extreme difficulty in obtaining the draft EIS/EIR. Some still do not have this document or other requested public documents. Secondly, no public notices of the project or public hearings were placed on the Medicine Lake campground bulletin boards this summer. It is estimated that 40,000 people now use these campgrounds annually. These campgrounds stand to be significantly impacted if the project is approved, due to excessive noise, visual impairments, loss of air and water quality and destruction of wildlife habitats. Thirdly, no attempts have been made to notify hunters of the proposed project by posting notices in local sporting goods stores, markets and hotels during hunting season. No hunting advocacy groups were on the mailing list of the draft EIS/EIR. Further no attempt has been made to notify persons who now, by permit, annually harvest mushrooms in and around the proposed project site. The failure to provide adequate public notice has deprived many taxpayers and area users, who have paid for the recreational developments to the Medicine Lake area, of a voice in determining the fate of the project that could have an impact on their recreation. BP.4

3) The draft EIS/EIR is totally inadequate as it fails to address the cumulative environmental effects of the development of geothermal power within the Medicine Lake area BP.5

Although Calpine's project proposal is to construct only one 49.9MW power plant,

the project requests approval for the construction of a transmission line that can serve up to six 49.9 MW plants. The draft EIS/EIR does not even attempt to address the potential environmental impact of several plants, all in operation concurrently. This assessment must be done in order to accurately assess the cost of development of geothermal power in this environmental sensitive area.

Secondly the draft EIS/EIR does not address the cumulative environmental effects of the Calpine project and the proposed Cal Energy Telephone Flats project. Given that Calpine's own project description states that the permitting process will assess possible impacts of both its project and those proposed within the vicinity, any environmental analysis should jointly assess the impact of both projects. In fact, the only way to properly assess the impact of geothermal development within the Medicine Lake caldera and surrounding areas would be for the lead agencies to consolidate and coordinate the environmental review process for all potential project permits. Piecemeal environmental review of individual projects is meaningless and in violation of both CEQA and NEPA. BP.6

4) The appropriate use for the Public Lands in and around Medicine Lake is recreation, not geothermal power plant development

Hundreds of thousands of taxpayers dollars have been spent over the last 30+ years to develop the Medicine Lake area as a recreational area for people who enjoy accessible wilderness. Thousands of campers, boaters, hunters, fishermen and snowmobilers visit the lake each year to enjoy its pristine beauty and wildlife. How many places in California can you daily see Bald Eagles, Blue Herons, Osprey and Goshawks? Medicine Lake is one of the few remaining pristine recreational areas in Northern California that offers such a variety of opportunities. These opportunities and the unique beauty of this lake will be ruined forever if this project is approved. Once this is lost, it can never be restored. BP.7

The appropriate use and future for the development of the Medicine Lake area would best be served to coordinate the future recreational development with the Park Service given the proximity to Lava Beds National Monument and the current development of the scenic corridor. BP.8

Mr. Sharp, at the public hearing you justified the proposed geothermal project in terms of the Forest Service's mandate for "multiple use of public lands." Please provide me with the specific policy (and law if one exists) that states that mission. As far as multiple use near Medicine Lake, logging has never been allowed in or near the caldera. How can geothermal development in the same area have less impact? BP.9

In conclusion, we refer you to the draft EIS/EIR, S-10, which describes the environmentally preferable alternative as the "No Action Alternative." As there has been no need demonstrated for the development of this project, this alternative is the only appropriate alternative to approve. BP.10

This letter will be supplemented with specific written comments to the draft EIS/EIR. We look forward to hearing from you promptly regarding the information requests made herein.

Sincerely

S. Peder Cuneo

Suzanna S. Cuneo and S. Peder Cuneo
Martha Spencer and Eric Nelson
Dan Spencer
cc: Peter Cartwright, CEO Calpine
G. Edward Merrihew, Calpine
Kathy Fisher, Environmental Coordinator BPA
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September 27, 1997

Mr. Randall Sharp
800 West 12th St.
Alturas, CA 96101

re: Fourmile Hill Geothermal Project; Comments to Draft EIR/EIS

Dear Mr. Sharp;

The purpose of this letter is to provide specific comments to the draft EIR/EIS. We developed the issues raised in this letter **without** the additional information that we requested in our letter of September 15, 1997. In addition we wrote this letter with very limited time to review the 800 page draft EIR/EIS. If the review process is to be at all meaningful more time must be given to allow concerned parties to read, review and analyze all of the information that contributed to the draft EIR/EIS.

In our letter of September 1997 we had requested an extension of the comment period to December 30, 1997. After a short review of the draft EIS/EIR we are requesting an extension to August 30, 1998. We have detailed the reasons for this extension in section III (Lack of Adequate Public Scoping)below. We are asking for a specific written response if the comment period for the draft EIS/EIR is not extended to August 30, 1998. As stated above, we are writing this letter without full access to all of the information that went into the preparation of the draft EIS/EIR, therefore we reserve the right to add additional information to our response as we receive further information. BQ.1

Please be advised that if the final EIS/EIR has a finding that allows for the development of this project we plan to appeal that decision. BQ.2

This letter is the result of a very quick analysis of a very long document and may have errors in fact or analysis but the intent of this letter is to preserve our right to appeal any administrative decision. The urgency required to develop any reasonable response to such a long and detailed document must be questioned. Why is there such a need to rush the analysis of this project when any decision could have such long-term and profound consequences. Who will benefit from a hurried analysis of this data? Who will lose? We believe the losers will be the consumers who will pay the cost of more expensive power and those who now enjoy the recreation and beauty of Medicine Lake. The only ones who stand to benefit are the owners of Calpine (and BPA?). The geothermal resource of the Medicine Lake area is not in danger of being lost, this is not a salvage timber sale and we must all: USFS, BLM, BPA, Siskiyou County, Calpine and private citizens, make an informed decision based on all of the information. BQ.3

Our comments on the draft EIS/EIR have four major components:

1) Lack of economic justification for the Fourmile Hill Geothermal Project

2) Areas in the draft EIS/EIR that lack sufficient information or do not fully address environmental consequences.

3) Inadequate public scoping.

4) The draft EIS/EIR does not adequately address the cumulative impacts of this project and other geothermal projects proposed in the Medicine Lake area.

I LACK OF ECONOMIC JUSTIFICATION FOR THIS PROJECT:

Page S-1 of the Executive Summary of the draft EIS/EIR states: "The purpose of the Fourmile Hill Geothermal Project is to the develop the geothermal resource on Calpine's Federal geothermal leases in order to economically produce and deliver electrical energy to the Bonneville Power Administration (BPA) and others." It has been pointed out in our letter of Sept 15th that both Calpine and BPA have admitted that the power generated by this project will cost twice as much as power currently marketed by BPA. For us to do a detailed analysis of this project we have requested the Economic Feasibility Study for this project, but this document has not been produced. Further, BPA has not officially stated that they will purchase this power. If we assume that BPA will purchase this power then we ask for a written response to these questions: BQ.4

1) How can this project be justified if it fails in its stated purpose in that it does not produce economical electrical power?

2)Explain how BPA will pass on to the consumers the increased cost of electricity that results from this project? How has BPA developed the consumer market for the power generated by the Fourmile Hill Geothermal Plant? Please provide any consumer surveys developed by BPA in an attempt to market geothermal energy as "green power."

3)Because Calpine is a private company, explain how they can afford to become involved in a project that produces electricity that is twice the cost of the product on the market. How is Calpine being subsidized in order for Calpine to be profitably involved in this project?

4)If BPA is not a committed buyer of the power why does this proposal have the transmission lines connecting to the BPA Malin-Warner transmission line? If BPA does not commit to this project where will the power go?

5)The final draft EIS/EIR must address the effect of utility deregulation and corresponding decrease in utility rates and this effect on the economic feasibility of this project (see below).

In the draft EIS/EIR (page 2-58,2-59), under Economic Benefits, the statement is made: "While the total capital cost can be projected with some certainty, **future cash flows are a largely a function of electricity revenues . . . and can fluctuate widely depending on market conditions.**". Page 2-79 states "Any factor that would drive the per unit rate for geothermal power even higher than current conditions would severely affect the ability of the project to compete . . . and may render the project financially infeasible. If the production capacity of the power plant were reduced and **Calpine could not charge a higher per unit rate, then Calpine would consider the project to be infeasible from an economic standpoint and the project would not be built.**" Please develop a written explanation of how Calpine could meet promised tax and royalty payments if this project cannot generate economically competitive electricity, given that the draft EIS/EIR admits that revenues can fluctuate depending on market conditions and that any decrease in revenue will render the project financially unfeasible. What will occur if there is a change in market conditions during the operation of this project and Calpine can no longer operate the plant in an economically feasible manner? Will the plant be abandoned? If the plant is abandoned how far will the $100,000 bond go toward restoring the environment (see below)?

Under this draft EIS/EIR, Calpine is required to post a $100,000 bond to pay for mitigation of environmental damage. We would like a written response on how this amount was derived. It is difficult to see how $100,000 could fully repair the environmental damage resulting from a serious plant disaster such as by a major well head leak, a forest fire that results from down transmission lines or a helicopter accident, damage resulting from construction activity or to restore an abandoned site. BQ.5

On page 4-301 of the draft EIS/EIR it is stated that this project will not affect Medicine Lake property values. We did not see where in the draft EIS/EIR there is a justification for this statement; on the contrary homeowners from Medicine Lake have been very concerned about the negative impact of this project. Please provide a written response how this statement was developed and how this project intends to compensate those property owners whose property has been diminished in value because of this project. BQ.6

II AREAS OF CONCERN IN THE DRAFT EIS/EIR ABOUT ENVIRONMENTAL EFFECTS:

PROJECT LOCATION

Draft EIS/EIR (page 2-6). The project is being developed on leases in the Glass Mountain Federal Geothermal Unit, but these leases are not committed to this unit or subject to the unit requirements. At several points in the draft EIS/EIR, Calpine claims that their proposed site is the only viable geothermal site. We would like a written response why this area was removed from the Glass Mountain Geothermal Unit and how can Calpine prove their claim as to the need for the exact location for the project if no test wells have been drilled? We believe this site has been selected to avoid coordinated environmental review under the Glass Mountain Geothermal Unit. BQ.7

WELL DRILLING AND TESTING

Draft EIS/EIR (page 2-14). At several points in the draft EIS/EIR there is a clear separation made between the construction phase of this project and the operational phase. At several points the effect of the drilling rigs on noise, light pollution and ground water use are made. However the draft EIS/EIR only provides a detailed analysis of the effects of drilling during the construction phase of this project. The draft EIS/EIR on page 2-14 states that; "... one in-fill or rehabilitation well would be drilled every two years." In fact this project will have well drilling during most of the 45 year operating life of this plant and not just during the construction phase. We believe that the draft EIS/EIR has not done a complete analysis of the effects of continued drilling. We would ask for a reassessment of the impact of continued well drilling for the duration of this project including visual, noise, ground water use and light pollution (these drilling rigs would be in operation 24 hours a day for all summer months). If this reassessment is not made please provide a written response. BQ.8

HYDROLOGY (pages 3-14/15 and page 4-36)

In the draft EIS/EIR several assumptions are made of the effect of this project on the water quality of Medicine Lake. Page 3-15 gives reference to water quality of Medicine Lake. These studies were done in 1971, 1982 and 1983, the most recent in BQ.9

1992. None of these studies did any detailed analysis of water chemistries including metals and organic compounds. If the current concentrations of metals are unknown, how can the effect of air emissions from the Fourmile Hill project, on Medicine Lake (page 4-36) be determined. Given that the table in the draft EIS/EIR has arsenic, beryllium, cobalt and sulfate all approaching MCL/SNARL levels, knowing the current amounts of these metals in the lake is very important. We are asking for more information under mitigation measure 4.3.7a and how Calpine would be expected to perform a more sophisticated depositional analysis. This depositional analysis must be done **before this project is allowed to be developed.** Our concern is that mitigation measures 4.3.1a and 4.3.2a will only be placed into effect after water quality or water availability problems have been determined, they do not prevent these problems from developing. Mitigation measure 4.3.1a must be included in the final EIS/EIR (those parts dealing with monitoring water quality) so all interested parties can assess if these measures are adequate to protect the water quality of Medicine Lake. In addition the precipitation data for Medicine Lake is based on data generated at McCloud, CA more than forty miles away (page 3-177). If assumptions on groundwater resources are used to determine the effect of supply wells, to this project, then more accurate data must be used. Please provide a written response to these concerns.

TRADITIONAL CULTURAL VALUES

We agree with the draft EIS/EIR (page 4-66 and page 4-75), that this project would have significant unavoidable effects on the Medicine Lake Highlands by significantly impacting traditional Native American cultural values. The draft EIR/EIS states that only the decommissioning of the project would have a long-term beneficial effect on the spiritual and religious value of the Medicine Lake Highland in that it would remove the project facilities. Unfortunately, these long-term beneficial effects would only come about after the project has been in service for more than 45 years. BQ.10

We would like more information about Mitigation Measure 4.6.3b How will the noise monitoring program function as it applies to Native Americans and would other interested parties be able to access that information? We also want to know if other concerned parties would be able to reschedule Calpine's activities as allowed for by Native Americans. BQ.11 Under Mitigation Measure 4.6.7a, how many jobs does Calpine actually plan on providing to Native Americans and what are the job descriptions? The work force description provided on page 2-57 would indicate that personnel involved in the construction and operation of this plant require specialized skills and training. Does Calpine intend to provide training to Native Americans so they could gain employment or does the lack of specialized skills preclude them from many of these jobs? Please include a response to these questions. BQ.12

On page 4-78 the tribes have stated the project would affect the spirituality of the Medicine Lake Highlands. As stated in the draft EIS/EIR, this would be inconsistent BQ.13

with current Klamath LRMP standard 24-25 and would be a significant finding under CEQA. The response of the draft EIS/EIR is to amend the Klamath LRMP. We are asking if any other project in the Klamath National Forest would be impacted by the change in the LRMP or if this amendment is being done only to facilitate the development of the Fourmile Hill project. Please detail, in a written response, any other project impacted by this change in the Klamath LRMP and any Native American response to this change in standard 24-25.

WILDLIFE

Our concern with the draft EIR/EIS is that it fails to provide any comment on the long term effects on water quality of Medicine Lake resulting from emissions produced by this project. The draft EIS/EIR does not address the effect on lake water pH as the result of hydrogen sulfide accumulation in the water and land surrounding Medicine Lake. Without knowing the effect on lake pH levels it is impossible to determine the effect on lake wildlife as the result of emissions from the project. The assessment of water quality did not examine the possible effects of decreased water pH and the resulting effects on fish and amphibians living in and around Medicine Lake. The draft EIS/EIR did identify elements found in the steam plume (and therefore deposited in and around Medicine Lake) including arsenic, beryllium, cobalt and lead. The draft EIR/EIS did not provide any assessment of possible metal accumulation in fish in the lake and the effect on birds (Bald Eagles and Osprey) that feed on these fish. We firmly believe that this is a serious omission and that proposed mitigation measures (measures 4.3.1a and 4.3.2a) do not adequately address this issue. Because these measures are activated once a problem has been discovered, they do not prevent water quality deterioration from occurring. BQ.14

On page 4-125, bird collision/electrocution has been identified as a possible problem. The species most likely to be affected are Bald Eagles and Osprey. Bald Eagles and Osprey are special-status species and would be exposed to collision/electrocution if segment A1 is developed along Medicine Lake. We do not agree that this is a less than significant finding because the effectiveness of the mitigation measures (4.8.4a) has not been demonstrated. In addition, there is no reference in the draft EIS/EIR to any further mitigation measures if 4.8.4a is ineffective. The draft EIS/EIR did not determine at what level the mitigation measure would be considered ineffective, what is the trigger point in the number of dead or injured Bald Eagles or Osprey that would require improved mitigation measures? The draft EIS/EIR does not require any monitoring of the populations of Bald Eagles or Osprey in the Medicine Lake area. Without monitoring the changes in numbers of these birds it is impossible to determine the effect of this project on the species. We would like a written response to these concerns. BQ.15

VISUAL QUALITY

The draft EIS/EIR has an excellent description of the Medicine Lake Caldera, page 3-124. "Medicine Lake is located at the visual and topographic center of the Caldera. There are **no telephone or electricity service lines serving the basin.** Combined, these characteristic create a strong sense of place and remoteness to the lake . . . With the exceptions of a few private cabins and the public boat launch that visually encroach on the lake and the shoreline, there is an **overall sense of intactness to the lake's character.**" We contend this project does have a significant impact under CEQA and USFS visual assessment practices. In the draft EIR/EIS there are assessments made of the project's visual characteristics using certain assumptions. We are challenging the accuracy of some of these assumptions: BQ.16

Steam Plume Assumptions (page 4-138): "As a result of periodic presence and ephemeral nature of steam plumes, the visual analysis assumes that the visibility of steam plumes . . . could not result in potential long-term inconsistencies with USFS VQO's. Additionally, the fact that many forest visitors and residents may not readily distinguish steam plumes from other clouds or features in the sky further supports this assumption." We cannot understand how a steam plume that will extend 250 feet above a 70 foot high cooling tower will not have an impact on the VQO, particularly from Medicine Lake KOP's. The draft EIS/EIR on page 4-139 states that "cooling tower steam plumes could be **visible year round**." In addition well venting steam plumes will be visible for up to six weeks and reach a height of 285 feet because of well flow testing (page 4-138). We believe that any visitor to Medicine Lake would find this visually offensive and would not confuse a steam plume with a cloud. The VQO for cabin residences and campground users, at Medicine Lake, would definitely be impacted because of the constant presence of these plumes. BQ.17

Lighting Assumptions: The draft EIR/EIS describes lighting for drilling rigs as being the full length of a 145 foot tall rig, and that drilling rigs would be in operation 24 hours a day. We do not believe that the draft EIS/EIR is accurate in stating that this lighting would not affect KOP's in the Medicine Lake area. Because this has the potential of having such a devastating effect on the visual quality of Medicine Lake we would ask that the lighting assumptions be reexamined and that an effective model be developed so that residents of Medicine Lake and campground users can have a better assessment of the effect of drilling rig lighting and the effect of operational lighting used by the power plant. The draft EIS/EIR does not accurately address the effect of night lighting on KOPs 2,3 and 5. It is impossible to determine from the draft EIS/EIR how the determination was made that the lights would not be visible from Medicine Lake. The draft EIS/EIR did say (page. 4-145) that; "This impact (drill rig and power plant lighting) would be significant as this lighting would create a long-term inconsistency with the VQO of Retention which covers the power plant site." The draft EIS/EIR goes on to say " . . . lighting would likely draw visual attention as it would create a strong visual contrast with nighttime conditions." We are concerned that these visual contrasts would not be limited to the plant area and would have a negative impact on BQ.18

VQOs in the Medicine Lake area. We are concerned that a wilderness lake will have the nighttime appearance of a football stadium. Please respond, in writing, to these concerns.

The draft EIS/EIR states on page 4-162 "The visual impacts from the Medicine Lake shoreline (KOP's 2,3,5) would be considered significant and unavoidable . . . Mitigation measures 4.92a and 4.9.2b would not eliminate the visibility of well venting and cooling tower steam plumes from these KOPs. Therefore, with mitigation, the visibility of segment A1 of the transmission line would result in a significant unavoidable impact as the visibility of both transmission line and steam plumes would impact the overall visual characteristics of the Medicine Lake area." If the final EIS/EIR supports any alternative except #7 (no action), then there must be written documentation of how these documented effects, found in the draft EIS/EIR, have been rectified with CEQA and USFS VQOs. The draft EIS/EIR is very clear on the unique visual qualities found in and around Medicine Lake, it is also very clear from the draft EIS/EIR this project will have a substantial negative impact on those qualities. BQ.19

LAND USE AND RECREATION

The Medicine Lake area has been developed by the USFS as a destination recreation site and has year around recreational use. The draft EIS/EIR states that 40,000 people use the Medicine Lake campgrounds, yearly and the number is increasing (page 3-157). This number does not include hunters, mushroom harvesters and winter snowmobilers that do not use formal campground facilities. Much of what brings people to Medicine Lake was described on page 3-124, " . . . these characteristics create a strong sense of place and remoteness to the lake . . . " A fundamental question is what will be the effect of this project on the recreational experience to the more than 40,000 people who visit this lake yearly. The draft EIS/EIR has some comment on what they will see (draft EIS/EIR page 4-193). This page details the negative effects on recreation because of the operation of the project. "During the project operation, the recreation experience of visitors could be affected as the result of odors, noise, and visual presence of facilities . . . Recreationalists would see a range of activities, including well maintenance, drilling and cooling tower and well venting steam plumes." BQ.20

The recommended solution to any recreational user that is bothered or annoyed by the visual and auditory assaults from the project is to "move out of the vicinity or make a decision not to hike or hunt in proximity to this site." We feel this is not an adequate response to this problem. People who use Medicine Lake for recreation often do so because of the quality of the environment. Once this quality has been degraded, because of the effects of this project, they cannot move some place else, because there is no other place in Northeastern California like Medicine Lake. Property owners cannot reduce the effects of loss of visual quality, water quality or loss

of property value by moving out of the vicinity. The effects of this project will last the duration of the power plant (45 years).

The USFS has identified the Medicine Lake area as a unique recreational site. In the draft EIS/EIR (page 3-163) it is pointed out "Timber harvests are also limited in the project vicinity by the existence of the developed recreational area at Medicine Lake. Typically, only salvage harvesting of dead and downed trees . . . are being conducted in the project vicinity." If the unique recreational qualities of Medicine Lake are such that timber harvesting is prohibited, then how could a power plant be compatible? BQ.21

Homeowners in the Medicine Lake area have enjoyed a reasonable degree of security, for their cabins, during the winter months do to the remote location of the lake and snow cover. With the addition of the project and associated roads this security will be lost. . The draft EIS/EIR does not address the cost to Siskiyou County for increased sheriff's patrol activity and the potential losses uncured by homeowner by theft or vandalism as the result of increased accessibility resulting from highway development. BQ.22

AIR QUALITY

Our primary concern is the effect of H_2S from the operation of the plant. On page 4-240 there is an analysis of emissions. Our concern is the availability to the public of information generated by receptors and the effectiveness of Mitigation Measures. Will the public (campers and cabin owners) be informed if emissions exceed allowable limits? Mitigation Measure 4.13.2a states that "SCAPCD *could* require additional control measures to ensure compliance with emission limitations." We believe that this wording is too vague and that this Mitigation Measure should be more strongly worded to insure that SCAPCD would require compliance with air quality emissions. BQ.23 We are also concerned about the possible number of plant upset conditions. The model used to determine total H_2S emissions is based on a specific number of plant upsets annually. We want to know how the number of plant upsets is reported and if this information is provided to the public. BQ.24 We are concerned that Mitigation Measure 4.13.5c does not do enough to prevent excessive H_2S emissions in that Calpine must throttle back well production "if possible" after 6 hours to meet SCAPCD emission requirements. Will the public be informed if these emission requirements are not met and will the public be provided with information on the actual amount of H_2S produced by this plant annually? BQ.25 How does SCAPCD plan to insure that air quality standards are continually monitored? BQ.26 If Calpine is found in chronic noncompliance with air quality emission requirements what will be the response of SCAPCD and the USFS? BQ.27 We would like a written response to these questions.

Table 4.13-8 provides the annual emissions of Non-Criteria Pollutants (lbs/year). Again this table is based on assumptions of a specific number of plant upsets, along BQ.28

with plant operation and infill well drilling. How will the actual levels of these non-criteria pollutants be measured? It is unclear from the draft EIS/EIR if there will be long term monitoring stations and if these stations will measure the actual amount of pollutants. The draft EIS/EIR provides assurances that non-criteria pollutants will not provide substantial human health risks (page 4-246). There is no information on the effects of these projected emission levels on wildlife (fish and predatory birds) or what mitigation measures would be taken if it is determined that higher levels of these pollutants are being emitted. BQ.29 We would like to know how criteria and non-criteria pollutants will be measured, how the accumulated amounts will be measured and how the public will be informed. BQ.30

NOISE

The draft EIS/EIR on page 4-262 finds that the noise of construction would provide a significant unavoidable impact. It is unclear how effective Mitigation Measures 4.14.2a through 4.14.2c would be in reducing this impact. Specifically how would Mitigation Measure 4.14.2c be controlled? What is the limitation on "nearby residences"; how would complaints be presented to Calpine and how timely must Calpines response be? It is our concern that if the administrative process requires that complaints pass through Calpine, to the Forest Service office in Alturas and then a Forest Service official despatched, with no identified time lines, this would not provide an effective enforcement of this measure. BQ.31

There was also no assessment of the effects of helicopters, that would be used for the construction of the transmission lines, on the campground areas. BQ.32

III LACK OF ADEQUATE PUBLIC SCOPING:

The development of the Fourmile Hill Geothermal Project is a large undertaking, involving several agencies, private companies and the public. It is our contention that many members of the public, who would be most directly affected by this project; have not been informed as to the development of this project; have not been given access to information about the project and have not been allowed to make their views on the project heard. Some readily identified members of the public who were not contacted during the public scoping are detailed below, including campers, hunters and mushroom harvesters. BQ.33

The group that will be most directly affected is the recreational users of Medicine Lake. According to the draft EIS/EIR, more than 40,000 people use the Medicine Lake area annually for recreation. Was there any attempt to inform these people about this project, were there any notices posted at the Medicine Lake campground, was there any attempt to hold public meetings at the campground, **no!!** Public hearings were conduced in only three locations, one of which, Klamath Falls, is the site of a

geothermal research unit. However, USFS records show that more than 1/3 of the campers using Medicine Lake (over 15,000 people) are from Redding, California, but not one public meeting was scheduled for the Redding area. Of the press clippings in the draft EIS/EIR not one is from a newspaper in the Redding area, of the names on the mailing list only eight names of private individuals, in the Redding area, are listed out of the 306 mailings. Why has the public scoping process avoided obtaining input from these users of Medicine Lake? This project will have an impact on the recreation of more than 40,000 people, of which almost 15,000 come from a single geographic area. No attempt was made to inform these people about this project or to obtain any input from them. Without the informed input from such a large number of users of this resource the public scoping for this project has not fulfilled the requirements of CEQA or NEPA.

The area around Medicine Lake is heavily used as a deer hunting area yet no attempt was made to inform the hunting public about this project. Why was a group that makes heavy use of this area denied information and the ability to have some input on a project that will have such long term effects? There is no hunting advocacy group identified on the mailing list nor was there any indication that hunting groups were contacted about this project.

There is no indication in the draft EIS/EIR that individuals that hold permits for the harvest of mushrooms have been contacted about this project.

Many homeowners in the Medicine Lake area did not know of the project until the August 30, 1997 homeowners meeting. Since then there have been many requests for more information from members of this group. The president of the homeowners mailed a request for information in July 1997, that information was not received until September 1997. If the public is not given the necessary information and not given an opportunity to assess and respond to that information then this process is not truly providing accurate public response. BQ.34

In order to insure that members of the public, who will be impacted by this project, have an opportunity to involve themselves in the public scoping process we are asking for the following:

Allow public response to the draft EIS/EIR until August 30, 1998
Publish information about this project in more regional newspapers BQ.35
Have public hearings in the Redding area
Post information about the project in the Medicine Lake campground until the end of hunting season this year and post information next summer
Insure timely responses to request for information as requested under FOIA, to all interested parties that have requested information.

Delay the start of construction, if this project is approved, until spring of 1999 to allow all involved parties an opportunity to become involved in the public input process.

IV CONCERNS ABOUT THE ASSESSMENT OF CUMULATIVE IMPACTS:

The Fourmile Hill Project is the first of two geothermal projects that are actively being developed in the Glass Mountain KGRA. These two projects will use the same transmission line and be physically less than five miles apart. Yet the draft EIS/EIR presents very little factual information on the cumulative impacts of these two projects. It is our contention that these projects should be evaluated together and that **all** models for air and water quality, noise and visual effects fully evaluate the **additive** effects of these projects. A more unified approach for the development of the Glass Mountain KGRA would be to do test well development at both sites (Fourmile Hill and Telephone Flats), both of which have test well approval. After analysis of the known resource then a final EIS/EIR can be developed that gives an accurate indication of the overall effect of geothermal development in this area. It is difficult to believe that a draft EIS/EIR for a single project covers more than 800 pages, and finds significant environmental concerns, but a similar project less than 5 miles away will not have a significant cumulative impact. We believe that the draft EIS/EIR has deliberately minimized the cumulative impacts in order to make the Fourmile Hill project more acceptable. BQ.36

In summary, Mr. Sharp, we are asking that there be an assessment of the areas that we have questioned in the draft EIS/EIR. We believe there is no economic justification for this project and we have serious questions about parts of the draft EIS/EIR. We believe that important parts of the public have not had an adequate opportunity to be informed and to respond about this project and we are concerned about the cumulative effects of similar projects in this area. We only need to examine the draft EIS/EIR to see what the long-term environmental consequences of this project will be. Mr. Sharp, our families have grown up in the West and we have seen the loss of many truly unique natural treasures because of the drive for economic development. How does this project reflect a sprit of collaborative stewardship, by depriving more than 40,000 people a unique recreational resource and increasing the energy cost for 45,000 homes? Medicine Lake is truly a unique place, one of the last, best places in Northern California. The public does not need this power plant, Calpine and BPA do not need their profits, as much as we all need what Medicine Lake has to offer, as it is today. If this plant is built, the negative environmental effects will be with us for the next 45 years, there is no need to rush judgement on this project. BQ.37

Sincerely,

S. Peder Cuneo

Susanna S. and S. Peder Cuneo

Bill DeJager
P.O. Box 951
San Leandro CA 94577

Letter BR

August 24, 1997

Mr. Randall Sharp
Fourmile Hill EIS/R Coordinator
800 W. 12th St.
Alturas, CA 96101

Dear Mr. Sharp:

This letter is in response to the draft EIS/R. I want to express my strong opposition to:

1) Locating industrial facilities, including power lines, close to Medicine Lake. **BR.1**

2) Bisecting or otherwise developing the Mt. Hoffman roadless area. **BR.2**

It's been a few years since I've been to Medicine Lake and the surrounding area, but I'd hate to see this area spoiled by intrusive developments. I use electric power myself, so I won't object to some sort of development, but the power lines should be routed away from the lake, as in alternative 5. **BR.3**

Also, the remaining roadless areas in northeastern California are few and small in size, and mostly unprotected. These areas should be left in a natural condition, with only existing, low-intensity uses allowed. // Alternative 5 meets this condition. I therefore urge the Forest Service and BLM to adopt Alternative 5. **BR.4** **BR.5**

Sincerely,

Bill DeJager

P.S. Next time I'm in Alturas again I'll have to stop by that Basque restaurant (if it's still there)!

Letter BS

United States Forest Service
630 Sansome St.
San Francisco, Ca. 94111

Dear Sirs:-

My wife and I certainly hope you do not allow geothermal plants near the Medicine Lake area. We do not want you to even mention it's name. It is the quietest, prettiest place in California.

Please leave this pristene gem the way nature intended. It, (and the area around it) should be left alone. It would even be a dirty shame to allow better roads into the whole area. BS.1

Thank you for letting me have your attention.

Thank you.

Paul Wiember
Charlotte M. Dember

2243 40TH AVE
SAN FRANCISCO CA. 94116

Letter BT

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. BT.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. BT.2

Sincerely

W S Denham (Denham)
PoBx 9995
Truckee Cal 96162

Letter BU

Bob DeNike
400 E. Remington Dr.
Apt. F255
Sunnyvale, CA 94087-2606
(408) 749-9135

9/14/97

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp,

I oppose the permit request by the CalEnergy and CalPine power companies to construct a geothermal plant in the **Medicine Lake Highlands.** BU.1

This pristine area contains archaeological sites, spotted owl nesting habitat, two roadless areas and old-growth forests. These resources deserve maximum protection. BU.2

I question the legality of such a project where it would impact an endangered species such as the spotted owl. The importance of this habitat has been recognized by the Clinton administration as an old-growth reserve. BU.3

I am weary of watching our last remaining islands of wilderness in North America whittled away by profit-hungry corporations. Please protect the Medicine Lake Highlands from development. BU.4

Sincerely,
Bob DeNike

cc: Senator Barbara Boxer
Senator Dianne Feinstein

Letter BV

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Carlos DeRossett
Address: 4409 N. old Stage Rd
Mt. Shasta, CA 96067
Phone: 916-926-0931

Comments: I worked on the Realinement & Repair of the Road From The McDonell Yard to Plant #13 At the Top of the Hill I worked For Mitry G.E.B. I Stayed At the Boys Camp where you Turned To the left Above Lincoln Rock. I was the Master Mechanic Most Weeks I worked 6 days A week. The Job was A Real Challange But the Enviorment & Smell in the Air was Almost Unbearable. Everything Smelled Like Sulphur. The Air, the Ground Everything // When the wells were vented the Noise was Loud, when you Drilled & Hit Steam it was Loud! For 3 weeks Or 1 month // I Don't think Medicine Lake Needs this. When I moved My Trailer out of there on Xmas Eve You could Smell it For 6 Months. Every one wanted To Know if My Holding Tanks were Full // Please Do Not Do this To Medicine Lake Area. Tell Everyone The truth About your Organization. So Far Everyone Has Been Lied To! BV.1 BV.2 BV.3 BV.4

Carlos DeRossett

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Feel Free to Call Me Anytime

Letter BW

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Hill Projects
Modoc National Forests
800 West 12th Street
Alturas, CA 96101

Dear Sir,

We are writing to express our concerns with geothermal projects within the Medicine Lakes Highlands area. This is a beautiful part of California containing significant remnants of old growth forest, outstanding habitat for wildlife and excellent recreational opportunities.

BW.1

We believe that the proposed power plants, new roads, geothermal wells, and power lines that this project involves are not appropriate in this area. Please do not let this geothermal project go forward.

Thank you for your consideration.

Sincerely,

Joel D Despain
Joel D Despain
HCR 89 Box 211
Three Rivers, CA
93271

Donna Meisky
HCR 89 - Box 109
Three Rivers, CA
93271

Dale Haskins
DALE HASKINS
HCR 89 Box 304
THREE RIVERS CA
93271

Yesenia Reglund
HCR 89 Box 202
Three Rivers, CA 93271

Monica Buhler
MONICA BUHLER
P.O. Box 225
Sequoia Nat'l Park
CA 93262

BRIAN BLASER
HCR 89 BOX 103
THREE RIVERS CA
93271

Crystal Dickford
Crystal Dickford
HCR-89 Box 104
Three Rivers, CA 93271

"POPPY"
LEA SPEARS
P.O. Box 806
KINGS CANYON
93653

Pat Linebock
42175 Myrah Dr.
Three Rivers, CA
93271

Ann Huber
Ann Huber
HCR-89 Box 201
Three Rivers, CA 93271

Letter BX

RECYCLED PAPER

Dean H. du Vernet
1448 Fourth Street
Baywood Park, CA 93402-1606

Mailed Sept. 15, 1997

Mr. Randall Sharp, Project Leader
RE: Fourmile Hill / Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

* NOTE: Please update me on any news concerning these projects

BX.1

Dear Mr. Sharp:

I greatly appreciate your time. I've visited the Medicine Lake Highlands for 40 years, starting with camping trips with my father — I was awestruck, even at an early age, at the vast grandeur and majestic, ancient beauty of eastern Siskiyou County. We visited the highlands and Lava Beds National Monument, and the stark volcanic landscape was always exciting and dramatic. I also enjoyed the fauna and flora, and since com-

BX.2

pleting my schooling I understand the complexities of pristine ecosystems. I have an Associate in Natural Resources Management, a Bachelors in Biology and a Masters in Environmental Biology; and I'm very much against any geothermal development by CalEnergy and Cal Pine. // Please do not allow geothermal power plants, well sites, electrical towers or any new roads in the highlands, which are a very special wilderness (and there's not much left compared to what there was), and I believe it should be a protected biosphere. //

BX.3

And here in California we receive $80 billion per anum based on international & national visitation to our State and national parks & forests. This makes the highlands part of an economic attraction which brings in more money than any other endeavor. Tourism is the biggest business in the state of California, in the U.S. and the world.

BX.4

Besides, geothermal power is fleeting and quite transitory: e.g. the Mammoth & Geysers plants are losing power fast // and any power gained by the highlands would go to Oregon. Why destroy the highlands so as to export energy? // Please protect our natural heritage.

BX.5

BX.6

BX.7

* INCLUDE THIS LETTER AS OFFICIAL INPUT. THANK YOU, [illegible]

Running Out of Steam

The Geysers paradigm for California: Energy's a limited resource

About 100 miles north of San Francisco, engineers are watching a super-heated example of how California's booming growth often diminishes the resources that made it grow in the first place.

They also may be watching geothermal energy disappear from the list of "renewable" alternatives to oil and natural gas—so-called because these sources do not run dry over time the way an oil field does.

Starting in 1960, a division of Unocal began capturing steam from natural geysers and using it to spin turbines that generate electricity for Northern California's biggest public utility. It seemed safe for Pacific Gas & Electric Co. to assume that the steam would keep the turbines spinning indefinitely—in any event certainly long enough to make the investment in geothermal power plants worthwhile.

The steam is created by molten rock that had thrust itself close enough to the surface to make underground water boil. One thing that made it seem safe to assume it would go on was that the hill country may have been sending up plumes of steam for as long as a million years.

But after just 25 years the Geysers, as the region is known, is running out of steam. This year, the steam level is down by nearly 20%. And PG&E already is planning to retire four of the generating plants that have been built since 1960 and that produce 6% of the electricity used in California.

In the process, steam condensed into water that was not pumped back into the underground aquifers. As seems so obvious now, there was clearly less water down there than anyone realized. Engineers now capture some of that condensation and pump it back, but it is not nearly enough to keep steam pressure in the geothermal wells from dropping.

According to PG&E, the generators in the Geysers area make up the biggest geothermal complex in the world. How long it will last, or whether plans that are now being drafted to try to pump treated waste water into the wells to recharge the aquifer will work, is something that only time can tell.

But if the Geysers area goes dry, it will still be useful as a warning that California cannot make it just by hoping for the best, a reminder that its future depends very much on serious growth management.

NORTHERN CALIFORNIA

The Geysers Region Losing Its Steam

The world's largest complex of natural geothermal electrical plants, clustered in Northern California's The Geysers region, is running out of steam much faster than expected, according to energy experts. The area's more than 30 plants were originally expected to produce enough electricity for 500,000 households and account for 35% of the world's geothermal capacity. But steam pressure in the area has dropped below 200 pounds per square inch, less than half what it was when development began three decades ago. State Energy Commission Chairman Charles Imbrecht said the potential financial loss could reach into the hundreds of millions of dollars.

Letter BY

Dean H. du Vernet
1448 Fourth Street
Baywood Park, CA
93402-1606

9/19/97

* Note: geothermal energy throughout CA does not last long, and I have many articles that I will send you soon. BY.1

Dear Supervisor:

I greatly appreciate your time and effort to help me. I've heard the Medicine Lake Highlands are in danger of manipulation by Cal Pine & Cal Energy. BY.2

I've been visiting for 40 years, and this biotic and geologic landscape is precious & sacred to me, and it is one of the most novel bioregions in the world, and deserves full protection. I've written Randall Sharp but I wanted you to know how I feel (and many others, too).

Please do not allow development. Here in California we receive $80 billion per anum based on visitation to our national and state parks and forests. Our forests have been abused enough — 95% of ancient forests on public land have been cut. Was that fair or logical? Please do not mar the Highlands. Dean BY.3

PS: May I have a map showing protected wilderness? BY.4

Dean H. du Vernet
1448 Fourth Street
Baywood Park, CA 93402-1606

September 30th, 1997

T. R. Sharp

Letter BZ

Superintendent
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

NOTE: Thank you for reading this and I hope for a response concerning the Medicinelake Highlands — I hope they will be protected. BZ.1

Dear Superintendent:

I very much appreciate your time and effort to read this letter, and the enclosed articles, which relate to the Medicine Lake Highlands. I've visited the Highlands many times over the last 40 years (since I was born, and father went camping every year) and it rates as one of the most special places on this planet (and I've been to a lot of places). BZ.2

The president even designated it an old-growth reserve; and after 95% of ancient forests being cut on public lands (which is neither equitable, fair, economical nor "multiple-use) it seems logical to protect what little wilderness is left. BZ.3

I've been a Park Ranger Naturalist and I understand our moral obligation to be guardians of this planet but I also realize that tourism is the largest, most long-term sustainable business on Earth, in the U.S. and in California; and oil and geothermal extraction revenues, logging money, grazing payments and beef and sheep revenues and even the money made from California's agriculture all pale in comparison to tourism!! We receive $80 billion per anum here in California based mostly on international and national visitation to our state and national parks and forests!!! BZ.4

A geothermal plant involving acres of structures, wellsites, towers and power lines, and miles of new roads (the last thing we need in any national forest are new roads — in fact old roads should slowly be discontinued and replanted — this will take decades anyway) and manipulation of landscape as well as destruction of precious ancient forest (our natural heritage) is neither morally nor economically viable. And the $ goes to Oregon!!? BZ.5

The value of the Highlands is leaving it as is — to me the Medicine Lake Highlands are equitable to Yosemite, and would Yosemite or Yellowstone be the same with power plants, or shopping malls or condominiums or dams? Very few tourists visit Hetch-Hetchy anymore compared to Yosemite Valley, and it would have been more logical to have that land available for increasing tourist visitation. Please don't destroy land & ancient integrity in Modoc!! BZ.6

Running Out of Steam

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The steam is created by molten rock that had thrust itself close enough to the surface to make underground water boil. One thing that made it seem safe to assume it would go on was that the hill country may have been sending up plumes of steam for as long as a million years.

But after just 25 years the Geysers, as the region is known, is running out of steam. This year, the steam level is down by nearly 20%. And PG&E already is planning to retire four of the generating plants that have been built since 1960 and that produce 6% of the electricity used in California.

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But if the Geysers area goes dry, it will still be useful as a warning that California cannot make it just by hoping for the best, a reminder that its future depends very much on serious growth management.

TOURISM: THE WORLD'S BIGGEST INDUSTRY

- Tourism employs 204 million people worldwide . . . 10.6 percent of the global workforce.
- Tourism is the world's leading economic contributor, producing an incredible 10.2 percent of the world gross national product.
- Tourism is the leading producer of tax revenues at $655 billion.
- Tourism is the world's largest industry in terms of gross output, approaching $3.4 trillion.
- Tourism accounts for 10.9 percent of all consumer spending, 10.7 percent of all capital investment, and 6.9 percent of all government spending.

From Global Paradox *by John Naisbitt, © 1994 by John Naisbitt, by*

NORTHERN CALIFORNIA

The Geysers Region Losing Its Steam

The world's largest complex of natural geothermal electrical plants, clustered in Northern California's The Geysers region, is running out of steam must faster than expected, according to energy experts. The area's more than 30 plants were originally expected to produce enough electricity for 500,000 households and account for 38% of the world's geothermal capacity. But steam pressure in the area has dropped below 200 pounds per square inch, less than half what it was when development began three decades ago. State Energy Commission Chairman Charles Imbrecht said the potential financial loss could climb into the hundreds of millions of dollars.

Letter CA

Dear Mr. Randall Sharp: Nov. 22, 1997

I have visited your beautiful area for forty years! I sent a letter protesting the fourmile Hill project and I enclosed articles showing flaws of geothermal energy. I also stated Modoc Nat'l Forest, with its volcanic landscape, ancient forest and turquoise lakes, is one of the most special and dramatic ecosystems on the planet — and tourism will bring in more money and be more sustainable than geothermal activity. CA1

Did you receive my letter and articles? Also, I would greatly appreciate the addresses for these individuals ... Scott W. Lieurance of the BLM & Barbara Holder of Klamath Nat'l Forest. CA2

Thank you very much,

Dean H. du Vernet
1448 Fourth Street
Baywood Park, CA 93402-1606

Letter CB

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Richard E. Dye
Address: 341 Williams St.
San Leandro, CA 94577
Phone: 510-483-1232

Comments: I am a retired engineer from Pacific Gas & Electric Co. During my employment at P.G.&E I had several occasions to go to the geothermal field at the Geysers. The pupose of these trips were to determine where transmission lines were to be located or relocated. I can only say that I was always glad to be on my way home// CB.1

The stench from the wells which also pumped out hydrogen sulfide was quite overpowering. It permeated our clothes the car and could smell it on ones skin for hours afterward.// CB.2

I also noticed a great deal of corrosion of the various metal objects in the vicinity. I would not put in power plants in such a beautiful area. As it is now PG&E and other companies that sunk wells are now shutting down many of them because of a lack of generating power. They over-did a good thing. Please reconsider your options for the Fourmile Hill Geothermal Project. Thank you CB.3

Richard Dye

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
300 W. 12th Street
Alturas, California 96101

11-9-97

Letter CC

To: Randall Sharp Fourmile Hill Project Coordinator
From: Bob Eastman local interested person

Dear Randall:

Its very good that we received a letter from the Forest Service inviting participation. I sure do not know the remaining 300 or so who wrote letters and probably never will because I'm not a person who belongs to groups pro or con on environmental issues. The reason is that on both sides of a case there is too much aggressive hollering about the facts. One word that covers a lot is the old "gobbledegook" coined by a Senator about 50 years ago. CC.1

I have a question that as an amatuer geologist and one time miner and timber worker and outdoor person I would enjoy very much getting a reply on. I would like to get informed on just how geologically the estimated volume of energy to be made from each well is obtained. Along with that goes the question's obvious point that can your workers really determine how much hot steam will come from a heat bed and how are these heat sources "recharged". CC.2

Ive kept up with most energy problems since I watched Shasta Dam Boulder Dam and many others go into action. Thankfully they are sure workers as long as we have no bad droughts which no one has yet controlled. I have watched as nuclear energy plants have been disavouwed by the American public and now at Lake County the management of the geothermal projects have a big problem.

Unless Ive misread the news the annual output is now dropping at about 10 to 14 percent. To prevent wells from going dry a plan is now before the county fathers and public to take about 70 percent surface water and 30 percent waste water and from a large conduit to the sites pump it back to the hot beds for recharging. But the project authors at onset of the Geyser operations proclaimed that this was a "renewable resource" suggesting something like "perpetual motion". Unless I'm still untrained the laws of motion mechanically prevent such an event. But I myself might have suggested this notion to seek favorable publicity, I do not really think that "hype" is the basic problem. After all the nuclear buffs lost terribly proclaiming that atomic waste could be handled and that global warming would soften under nuclear plants. Its sad because I bet money we would have a thousand plants by the end of this century. CC.3

If I had any advice to offer to your management it would be to drop any proclamations of endless energy sources that may not be in the future. Instead give the public the good news that with about 10 percent of Californias energy now coming from clean geothermal sources and that there is plenty available we have to endorse the plans.

The timber industryof which I was a part as a 14 yr old kid in the old woods when trees were still 4 to 6 feet in diameter is wrong to claim that the woods will always yield renewable resources while demanding that we the public give up more of our very limited national lands.

It looks like someday you may be campaigning for water systems to be operating on water from the Klamath, McCloud, Pitt rivers to recharge the heat beds. Might as well move that into your scope. CC.4

Good luck
Bob Eastman

Bob Eastman
Lake Shastina, Ca

STATE OF CALIFORNIA—THE RESOURCES AGENCY

PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDDING, CA 96001
(916) 225-2300

October 16, 1997

Mr. Randall Sharp
Project Environmental Impact Statement/
Environmental Impact Report Coordinator
Fourmile Hill Geothermal Development
US Forest Service/US Bureau of Land Management
800 W 12th Street
Alturas, California 96101

Dear Mr. Sharp:

Fourmile Hill Geothermal Development Draft
Environmental Impact Statement (EIS), SCH #96062042

The California Department of Fish and Game (DFG) has reviewed the subject draft EIS located within the Glass Mountain Known Geothermal Resource Area (KGRA) on the Klamath and Modoc national forests in Siskiyou and Modoc counties. The project proposes to construct a 49.9-megawatt (MW) geothermal power plant with five production well pads and associated pipelines, access roads and a 24-mile transmission line. Approximately 388.5 acres of habitat will be affected by the proposed project.

The draft environmental impact report (EIR)/EIS addressed many of our previous concerns including floristic surveys that locate special status plant species. Identified populations of special status species will be marked and avoided. In addition, wetlands located along a segment of the proposed transmission line will also be avoided.

However, some issues that we identified in our June 17, 1997, letter were not adequately addressed in the draft EIR/EIS. This includes the lack of hydrologic data to verify that the proposed project would not impact surface or ground water recharge of Fall River Springs. Figure 3.3-4 of the draft EIR/EIS demonstrates the uncertainty in information on regional ground water flow directions. Collection of base line water levels are included with the mitigation (4.3.1a), monitoring and reporting program for hydrology (page 5-4). The project proponent proposes to submit "a hydrologic monitoring plan for the caldera and a defined local area". However, since there is a lack of evidence that the Medicine Lake Highlands are not related to Fall River recharge, the monitoring should include the Fall River area in the hydrologic monitoring plan. Furthermore, the mitigation measure for monitoring the effects of the project on ground water levels states that "...groundwater pumping rates shall be reduced if monitoring detects significant adverse impacts to water availability...." There is no mention of what the performance standards are that would lead to a conclusion of "significant" adverse impact. These levels should be determined prior to commencement of any project construction or operation.

In addition, we wish to reiterate our concerns for increased road densities in the project area. The project proposes to construct two miles of new roads. Excessive roads (>1.5 miles of open road/mile^2) are considered detrimental to wildlife. The DFG recommends that an equal number of miles of nonessential roads within the project area be closed permanently or gated to reduce the impact of the new road construction.

While the draft EIR/EIS does address the cumulative effects from both the Fourmile Hill Geothermal Project and the associated Telephone Flat Project, the draft EIR/EIS should also include the environmental repercussions of full buildout of the KGRA. The draft EIR/EIS indicated that the potential geothermal resource was originally estimated at 500 MW of electric power. An analysis of the cumulative environmental impacts of meeting this target should be addressed. This should include the amount of habitat that would be affected if future power plants, well pads, road construction, etc., would be built if the 500 MW target was met.

Thank you for consideration of these comments. If you have any questions regarding these comments, please contact staff biologist Ms. Terri Weist at (916) 459-1129.

Sincerely,

Richard L. Elliott

Richard L. Elliott
Regional Manager

cc: Ms. Terri Weist
Department of Fish and Game
1724 Ball Mountain Road
Montague, California 96064

Letter CD

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: WALTER R EASTMAN
Address: 5728 PORCUPINE CT.
WEED, CA 96094
Phone: 938-4428

Comments: I have studied the use of geothermal power. New Zealand's vaunted hot water became a disaster. Northern California existing wells are having terrific problems.
The CRATER LAKE attempt was a foolish suggestion.
At the most, in Modoc Co. one might get Hot Water "Space" heating to be done in Klamath Falls, Or.
Do not waste tax payers money on this project nor permit so called "PRIVATE" money to be used. Cancel the Nation now! CD.1

Walter Eastman

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter CE

September 12, 1997

Mr. Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flats Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Subject: Oppose Medicine Lake Highlands geothermal drilling

Dear Mr. Sharp:

I am writing to you to urge you to refuse permission by the Forest Service to the geothermal power companies CalEnergy and CalPine to construct a geothermal power plant in the Medicine Lake Highlands. CE.1

Destruction of one of our nation's greatest natural treasures does not justify the limited benefits and environmental and cultural costs of visual blight, habitat loss, and infringement on the religious practices of Native Americans. CE.2

So great are its extensive ancient forest and biodiversity values it has been designated by President Clinton as part of his Northwest Forest Plan with the eventual prospect of national monument status. CE.3

Please oppose this destruction of another of our natural treasures. CE.4

Yours truly,
Paul Emery
Paul Emery
12250 Iredell Street
Studio City, CA 91604

cc: Senator Barbara Boxer

Senator Dianne Feinstein

Letter CF

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Cindy Engstrom
Address: 1125 Deetz Rd
Mt. Shasta, CA 96067
Phone: 926-4216

Comments: The noise and "pollution" this project will create will spoil this beautiful area. CF.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter CG

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

'e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 › the address listed at the bottom of the page.

our Name: JIM EVANS
ddress: PO BOX 931
CEDARRIDGE CA 95924
hone: 272-4635

omments: I MISSED THE DEADLINE FOR COMMENTS. I LIVED IN CALISTOGA 1982-1987. DURING THAT PERIOD, THE GEYSERS PEOPLE DISCOVERED THEY HAD TO DISPOSE OF "SLUDGE" WHICH CAME UP WITH THE STEAM. THIS SLUDGE HAD ARSENIC AND HEAVY METALS AND HAD TO BE TRUCKED OUT THROUGH NAPA COUNTY TO AN APPROVED WASTE DISPOSAL SITE. NOT ONLY WAS IT AN UNFORESEEN CONSEQUENCE OF STEAM PRODUCTION, THERE WERE SPILLS AND AT LEAST ONE TRAFFIC ACCIDENT FATALITY DURING TRANSPORT OF SLUDGE. THE EIR SHOULD ADDRESS THIS POTENTIAL PROBLEM. CG.1

I HAVE CAMPED AT MEDICINE LAKE THE PAST TWO SUMMERS; IT IS A BEAUTIFUL PLACE TO CAMP, FISH AND WATCH THE EAGLES. I OPPOSE THE FOURMILE HILL GEOTHERMAL PROJECT. CG.2

'f you wish, you can mail your comments to:
Mr. Randall Sharp
JSFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
300 W. 12th Street
Alturas, California 96101

Steam: Adding water to ground may cause more, bigger quakes

Continued from page A1

sucked down between 6,000 and 11,000 feet, to course through fractures in searingly hot rock. Days or months later, it will shoot back upward through production wells as steam.

"This is really one of a kind," said Kelly Birkinshaw, geothermal program supervisor for the California Energy Commission. Already it has become a model for Santa Rosa, which is considering a similar, but larger, wastewater pipeline to the Geysers.

The $45 million project, led by the tiny Lake County Sanitation District, has been years in the making. Players ranging from steam producers such as Unocal to the federal Environmental Protection Agency have kicked in funds.

They hope to prolong the life of the Geysers, which even in decline produces more electricity than any such field in the world, according to the state Energy Commission.

The Geysers are "an incredible California resource," putting out about 2.5 percent of the state's electricity, said Claudia Chandler, assistant executive director of the commission. "It behooves us all to manage that properly."

Management will include closely watching changes that the new water supply could bring, such as a predicted increase in tiny quakes, troubling to some neighbors of the Geysers.

nuisance byproduct to be disposed of.

But 10 years ago, when production plummeted, engineers and geologists realized that the steam beds weren't being recharged. Instead, they were being sucked dry.

In the dismal years that followed, a half-dozen generating plants closed, including one partly owned by the Sacramento Municipal Utility District. One steam producer went bankrupt. PG&E, the biggest player at the Geysers, cut a third of its staff.

Electricity production at remaining plants slumped from more than 2,000 megawatts to between 1,200 and 1,400. And the economics of electricity changed, making it efficient to run the plants at high levels only during peak times.

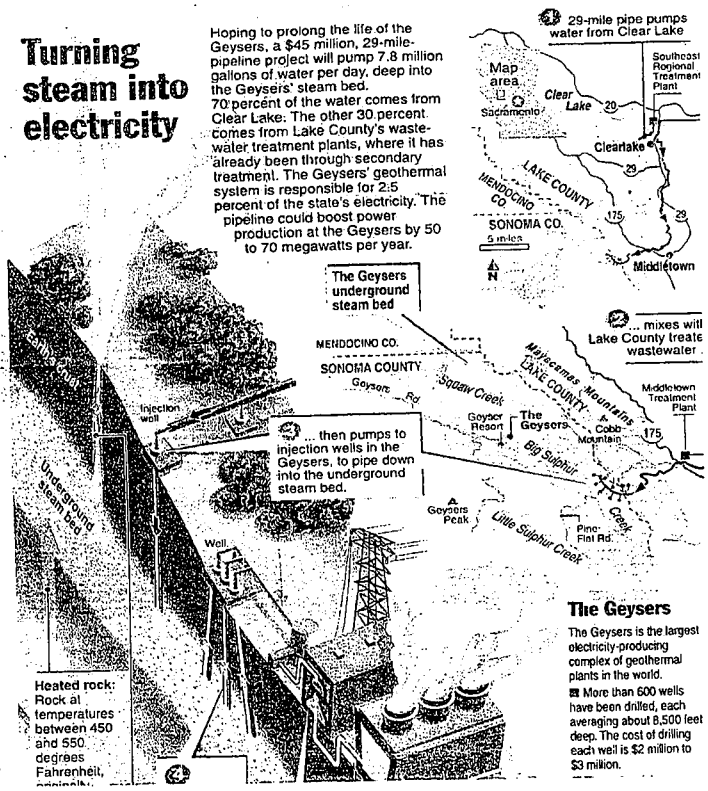
But over time, the handful of firms that produce steam or generate power at the Geysers have learned to accommodate lower steam pressure and have done much to recapture surplus water. Today, even rainwater is collected and sent back into the steam beds.

"They've gotten a pretty good handle on where injection does the most good," according to Mark Dellinger, Lake County energy and resource manager, who was instrumental in getting the pipeline project started.

With the project in its final weeks of testing, Lake County expects to begin feeding water into the Geysers this week and will

Turning steam into electricity

Hoping to prolong the life of the Geysers, a $45 million, 29-mile-pipeline project will pump 7.8 million gallons of water per day, deep into the Geysers' steam bed. 70 percent of the water comes from Clear Lake. The other 30 percent comes from Lake County's wastewater treatment plants, where it has already been through secondary treatment. The Geysers' geothermal system is responsible for 2.5 percent of the state's electricity. The pipeline could boost power production at the Geysers by 50 to 70 megawatts per year.



The Geysers

The Geysers is the largest electricity-producing complex of geothermal plants in the world.

More than 600 wells have been drilled, each averaging about 8,500 feet deep. The cost of drilling each well is $2 million to $3 million.

New life for old energy source?

Plan may renew Geysers steam

By Carrie Peyton
Bee Staff Writer

Sacramento Bee 12-5-97

A new pipeline that snakes 29 miles over rugged ridges southwest of Clear Lake last week began carrying lake water, treated sewage and hope.

Its designers want to help revive a fading enterprise: turning steam into electricity at the Geysers, the geothermal beds that boil deep beneath Lake and Sonoma counties.

Their method is as novel as it is ambitious. They are piping water out of Clear Lake and mixing it with treated wastewater that Lake County wants desperately to be rid of. The blend is pumped for miles up to the Geysers, desolate ridges in the Mayacamas Mountains studded with steam-fed power plants.

There, it will be piped into injection wells and

Please see STEAM, back page, A12

309

Letter CH

Elizabeth V. Farioletti
6434 North Old Stage Road
Weed, California 96094
September 29, 1997

USFS/BLM
Mr. Tandall Sharp, Geothermal Project Leader
800 W. 12th Street
Alturas, California 96101

Dear Mr. Sharp;

I would like to submit my objection to the Geothermal Project proposed for the Medicine Lake Highlands. I am very much against using this area for any type of power plants. Medicine Lake is already an area with a thriving tourist industry in the manifestation of hunters and fishermen. I can not see that the land would be able to support both types of industry. I strongly object to destroying a relatively pristine land which will become increasingly valuable as the years pass purely because it is comparatively undeveloped. I also object to an industry that would release hydrogen sulfide gas into the air or heavy metals into the ground and/or water in an area of natural forest beauty, a clear, unpolluted lake and clean air. These lands are under the stewardship of the United States Forest Service. This means that these lands are to be protected and preserved in their natural conditions. Building geothermal power plants does not seem to be compatible with this idea of protection and preservation. In fact, I would say that the development of such plants would be the exact opposite of this mandate. These power plants would destroy all that is good and beautiful about this area. Again I submit my strong and personal objection to such an idea. In fact I really wonder why the Forest Service would sell out to private industry the way it seems it has. I find this disgusting and destructive to the American way of life. I wish you would reconsider not only this project but your part in this action.

CH.1 CH.2 CH.3 CH.4 CH.5

Sincerely,

Elizabeth V. Farioletti

Elizabeth V. Farioletti

310

A resource with a volatile past, the Geysers started slowly with a Pacific Gas and Electric Co. power plant built in 1960. The idea was simple: drill as deep as 2 miles, past cap rock to where steam beds boil like a tea kettle through countless fissures in rock heated eons ago by a magma intrusion, and still as hot as 550 degrees Fahrenheit. Let the steam jet up through the well, then pipe it into power plants where it can turn the turbines that help produce electricity.

The man-made power plants worked just fine. But natural steam production was badly misunderstood.

"People thought it would go on indefinitely," said J.L. "Bill" Smith, senior geologist for the Northern California Power Agency, which sends several municipal utilities, including Roseville, power from its Geysers plants. "People thought there was recharge. A lot of people ... were allowed development on that basis," he said.

Chandler puts it more succinctly: "It was a free-for-all up there."

Power plants went in by the dozens. The water left over after power production was seen as a

dedicate the pipeline Oct. 16.

The pipeline will feed 7.8 million gallons deep into the Geysers every day, about 70 percent of it lake water and 30 percent treated wastewater that is considered clean enough to irrigate sanitation district land, but not to spill unrestricted off the property. Some regions allow such water to be used on golf courses, said Dellinger, but most insist on cleaner water for that.

Dean Cooley, senior steam generation engineer for PG&E's plants at Geysers, considers the treated wastewater "terrific," with fewer contaminants than the lake water it's mixed with. "We have no problems putting it in the ground," Cooley said.

The water will travel well-understood paths, said geologist Bill Smith of Northern California Power Agency. "There's a great deal of confidence that we know how to inject and benefit the most," he said. Designers predict the pipeline could boost power production at the Geysers by 50 to 70 megawatts per year.

All involved believe that once underground, the water will be far too deep to mingle with groundwater. And it's flowing in the wrong direction to move significantly out of the reservoir area.

The uncertainties involve subtler questions, of cooling effects, steam quality and earthquakes.

Decades of well drilling have sent tiny shivers through the Geysers, an area already prone to quakes. Maps that track seismic events year-by-year show a shifting cloud of black dots, spreading and darkening as the drilling has

Note: Graphic not to scale

by five different operators, including SMUD and PG&E, produce electricity at the Geysers.

■ It currently generates between 1,200 and 1,400 megawatts, enough to serve between 1.2 and 1.4 million people. Production, however, has been slipping by 3 percent to 5 percent annually.

Sources: Lake County Sanitation District, California Energy Commission, PG&E and Northern California Power Agency

Bee graphic / Nam Nguyen

shifted and increased.

When the pipeline starts sending water below ground, Cooley said, "you're putting cold water down in hot rock. That rock is going to fracture, expand, contract. There are going to be seismic events."

Tiny but noticeable quakes can already be felt nearby on an average of two or three times a week, said Hamilton Hess of Friends of Cobb Mountain.

"Residents in the area are pretty much fed up with all of this," he said.

While it is not opposing the pipeline, Friends of Cobb Mountain has been vigilant on the issue, and Hess will serve on a Lake County committee to monitor increased quake activity.

The project has drawn "very, very few" outright opponents, according to even its most vocal foe, Krista Rector. She is concerned about pipeline ruptures that could spill effluent, especially at any of its dozens of waterway crossings, as well as the increased quakes.

Although everyone agrees more jitters will ripple through the Geysers once the pipeline starts up, no one is sure how many, or what their cumulative effect might be.

Other unknowns, according to geologist Smith, are possible minute changes in the quality of the steam itself, and how much the added water will cool the hot rock immediately around each well.

Such questions will gain significance if Santa Rosa decides to build its own pipeline to send up to 18 million gallons a day of treated wastewater to the Geysers. The plan is one of several wastewater disposal options, but with some steam field producers offering to help fund it, "it's viewed as very workable," said Dan Carlson, who works in city utilities. He expects a decision to be made by late October.

A Santa Rosa pipeline, which could be completed by 2000, would feed into a different part of the Geysers, nearer to SMUD's remaining geothermal plant, SMUDGEO.

SMUD is "prepared to get involved" if it could benefit, said Colin Taylor, director of power generation, although any decision would have to be made by the district board.

While the Lake County pipeline would itself only stave off a slow death of the Geysers, a second pipeline could preserve it for years more, possibly indefinitely.

That's contributing to talk of eager buyers lining up when PG&E auctions off its geothermal complex at the Geysers next year.

The Energy Commission's Birkinshaw thinks between the two pipelines, the Geysers might never run dry, leveling off at around 700 megawatts a year.

"We're moving from what's a depletable to a sustainable resource," said Lake County's Mark Dellinger.

SETTING IT STRAIGHT

Accuracy is a fundamental of journalism. It is The Bee's policy in this standing feature to promptly acknowledge errors. Mistakes should be called to the attention of the editors involved by calling (916) 321-1001.

Letter CI

Marius A. Farioletti
6434 North Old Stage Road
Weed, California 96094
September 29, 1997

USFS/BLM
Mr. Tandall Sharp, Geothermal Project Leader
800 W. 12th Street
Alturas, California 96101

Dear Mr. Sharp;

I have lived in Siskiyou County since I was three years old. The main thing I like about this area is the natural beauty which surrounds us, although as I have grown older, I have noticed that some areas are not as beautiful as they once were five or ten years ago. I really do not understand why the Forest Service is giving private industry both the land around Medicine Lake, and the tax money to develop geothermal power plants there. Then the private industry would sell the energy and make a profit. It does not make any sense. CI.1

Medicine Lake is a beautiful area already used by hunters and fishermen who bring in much tourist money every year. Their impact upon the environment is minimal, whereas the geothermal plants would devastate the land, the water and the air. CI.2 Hydrogen sulfide gas is a very toxic poison which in extremely minute quantities causes great damage to not only humans, but any animal life. CI.3 Is Medicine Lake to become another Copper Hill, Tennessee? Why is not the United States Forest Service protecting our wilderness areas instead of making plans to destroy them? Why are you going along with this, yourself? I do not want these geothermal plants built near Medicine Lake. I want this area protected and preserved as it is for generations to come, so that my children and my grandchildren will know its beauty. CI.4

Sincerely,

Marius Farioletti

Marius A. Farioletti

Letter CJ

September 16, '97

Dear Mr. Sharp,

Please abandon plans to construct a geothermal powerplant in the Medicine Lake Highlands. Do you really want your short term business deal or do you want to do our home, this beautiful planet, a great favor and leave my favorite wild spot wild? CJ.1

Thank you

Krista Bennion Feeney

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

/e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 : the address listed at the bottom of the page.

:our Name: Betty Faist
Address: 1216 Cedarbrook Way
Sacramento Ca 95831
hone: 916-421-1026

:omments: I am strongly opposed to the Geo-thermal project as presented & proposed by Cal Pine. The project appears to be too over whelming & destructive to the pristine Medicine Lake & Medicine Lake Highlands - I cannot believe the Environmental Impact study will be approved My objections to this project - CK.1 CK.2 CK.3

B Faist

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

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For the Fourmile Hill Geothermal Project
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We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Catherine M Hardner
Address: 515 Redwood Rd.
Mt Shasta, Ca. 96067
Phone: 916-926-2193
4:30 PM 8-29-97

Comments: Just came from Mt Shasta Geo-T. Mtg. Much opposition to this plan - many ~~[illegible]~~ unanswered questions - Alternative plans would be solar or wind power from other place than our pristine Medicine Lake Highlands. All emissions of chemicals undesirable. Wild life migration interrupted & destroyed. And what happens to the fish in the lake? Visual, air, ground, water pollution to be considered. Native American concerns must be addressed, (not passed over) I don't think you can do that - and be satisfactory to their culture. Leave the native Americans in peace and don't plan on developing this project for above reasons & many more concerns. Law suits will be brought up by this local citizenry. Your project will impact too much land & too many people. Sincerely
Catherine Hardner CL.1 CL.2 CL.3 CL.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter CM

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: JOAN GHIORSO
Address: 41848 CREIGHTON DR.
FALL RIVER, CAL
Phone: 336-6578

Comments:

SIR.
FOR ALL GEOTHERMAL PROJECTS THAT MIGHT HAVE A IMPACT ON ~~[illegible]~~ ALL OF OUR WATER IN THE INTERMOUNTAIN AREA THE PEOPLE ON THE STUDY SHOULD BE HELD RESPONSIBLE FOR ALL DAMAGES — I KNOW MY 2 ATTORNEYS WILL FILE A LAW SUIT THAT ~~[illegible]~~ CAUSED ANY DAMAGES IN THE FALL RIVER WATER AREA ~~[illegible]~~ THOSE PEOPLE THAT MADE THE STUDY AND WHO CAUSED THE DAMAGES WILL PAY FOR EVERY THING — CM.1

John Ghiorso

PS. SORRY FOR THE BAD WRITING
I'M 76 YRS OLD

PS. I WAS BORN IN SANTA CLARA VALLEY AND SAW A COMPLETE DISTRUCTION OF THE WATER IN THAT VALLEY I HOPE WE DONT LET IT HAPPEN IN FALL RIVER VALLEY (PROTECT IT) — CM.2

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Phone No
916 336-6578

Letter CN

Randall Sharp, Project Leader
Fourmile Hill Geothermal Development
USFS/BLM — 800 west 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing in strong opposition to geothermal development in the Medicine Lake Highlands and in support of the Native American Tribes whose sacred lands are being threatened by geothermal developments. I support the Pit River, Modoc, Klamath and Shasta Tribes in their opposition to these developments which would have devastating impacts on th sacred character of the whole Medicine Lake Highlands; on many individual sites and cultural resources; on the water quality of Medicine Lake and the many springs, creeks and rivers that have their sources in the Highlands; on the animals, their habitats and migration routes; on th trees and plants; on the visual and air quality; and on the peace and natural beauty of the area. CN.1

I am concerned that the 300 megawatt transmission line has the potential to serve six power plants like the one being proposed as the Fourmile Geothermal Development. The combined impacts are not being addressed in the current Environmental Impact Statement. CN.2

sufficiently tested the potential hazards to water, air and life according to law // There is no demonstrated need for the project, and no economic feasibility study. CN.3

We invoke the US Government's Trust Responsibility to the Indian Peoples of this land, the Executive Order on Indian Sacred Sites, the Executive Order on Environmental Justice, the American Indian Freedom of Religion Act, the National Historic Preservation Act, and National Register Bulletin 38 on Traditional Cultural Properties. The environmental document you have prepared states that impacts to Native American cultural values will be significant and adverse. Geothermal development is incompatible with existing long-standing spiritual and cultural uses of the area and its natural resources. The government itself according to its own laws must not permit this development. CN.4

The Medicine Lake Highlands are a traditional haven to Native American People and have been used as religious, ceremonial, and gathering grounds for thousands of years. They are highly significant to the cultural continuity of the Tribes in Northern California and Southern Oregon.

The "No Action" alternative is the only right decision regarding this developmen that would devastate Native American sacred lands. CN.5

Sincerely,

Gloria Gomez
signature

Winter Tribe of Shasta
name and tribal affiliation

3066 School St Redding CA 96002
address, city, state, zip

(over for petition)

Letter CO

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Linda Gonzalez
Address: P.O. Box 324
Fall River Mills
Phone: CA 96028

AJUMAWI BAND!!
PIT RIVER!

Comments: I feel that personally my self & the Good Lord wanted these so call Geothermal power plants he would of put one there in the beginning of time. I don't understand how your people can come in any time they want, any place they want, with authority or they think so any has and destroy our Sacred Lands, be it so it may what ever our people use it for it is our, Not for you to come in tear up destroy, It may not mean nothing to you, because evidentally you don't have no values, or no respect for what is to be left alone, this place is so far smog free, So don't bring something that would destroy, Its beautiful because the Indian people respect it and loved it and take care of it, It does to show you will do anything for a little money that holds hurt. A Concerned Pit River Tribal member

CO.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter CP

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please bmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

our Name: Cathy Gould
ddress: Box 1392
Mt. Shasta
none: 926-1473 CA 96067

omments: Where do we stop? Or do we just keep on pushing & pushing the line between wilderness & "human resource area" until there is no wilderness left at all?

If I imagine a world without wilderness I am devastated & close to lost.

Please leave SOME areas untouched by the bulldozer or plough.

Yours Sincerely
Cathy Gould

CP.1

you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
lturas, California 96101

Letter CQ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please bmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ur Name: Martha Grainger
ddress: 135 Ski Village
Mt. Shasta, CA
one: 916 926-6664

omments: I absolutely do not want Medicine Lake area to be developed for geothermal energy!!! Is there nothing to be left sacred + natural ?? CQ.1

you wish, you can mail your comments to:
r. Randall Sharp
SFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
0 W. 12th Street
lturas, California 96101

Letter CR

September 16, 1997

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Subject: Four Mile/Telephone Flat Projects, Medicine Lake Highlands.

Dear Mr Sharp:

Please deny the CalEnergy and Calpine geothermal projects proposed for the Medicine Lake Highlands. These projects will destroy the beauty and integrity of this wonderful ecosystem. This area deserves permanent protection as a National Heritage site, not devastation for profit - for enery that leaves the state! // We must stop destroying our public lands out of corporate greed. Our frustration and mistrust of the Forest Service is continually exasperated, when your agency continues to support these types of environmental disasters. You are entrusted with the Public Trust, it is your job to make decisions based upon what is best for the public good, not merely for economic gain. Please do your job, and stop selling off the last of our ancient forests and wilderness areas! // I urge you to deny these projects, not only is it within your power to do so, it is in the interest of justice, and protection of these critical resources that you MUST DO SO! I hope that you will have the courage to reverse the horrendous trend that your agency has established over many years (timber salvage rider, timber theft, etc. etc. etc. etc.....) and make the right decision. NO GEOTHERMAL PROJECTS!!! Thank you. CR.1 CR.2 CR.3

Respectfully submitted

Steve and Paddy Graves
402 Pine Street
Capitola, CA 95010

4429 Las Encinitas Dr.
Fair Oaks, CA 95628
Sept. 15, 1997

Randall Sharp
Project Leader
U.S. Forest Service
800 West 12th St.
Alturas, CA 96101

RE: Fourmile Hill/Telephone Flat Geothermal Projects

This letter is in opposition to the Fourmile Hill and Telephone Flat Geothermal Projects. CS.1

As one who has paid many visits to the area over a 25-year period, I can say without hesitation that the projects would be disruptive to recreation use, damaging to the ecosystem and destructive to the some of the most dramatic vistas in California. CS.2 The Medicine Lake Highland is an active volcanic area. Such development would be complete inappropriate in such a setting. CS.3

We already have the example of the development of The Geysers geothermal area as a model. State and federal officials allowed massive overdevelopment of the area at great cost to recreational use, air and water quality. Now that The Geysers are literally running out of steam, the area is a blighted mass of idle power plants, underused transmission lines and badly eroding roadways and building sites. CS.4

The Medicine Lake Highland is one of the finest forest and recreation resources of its type in the nation, in addition to being a unique shield volcano. There is no economic reason powerful enough to permanently change its character and alter the values it currently has with such abundance. There also is the question of the disruption of sacred Indian lands - something that no government should allow. CS.5

The highest and best use for this land would be to include it in a greatly expanded Lava Beds National Monument which would encompass the entire highland.

Sincerely,

G. S. Green

cc: The Hon. Diane Feinstein
The Hon. Barbara Boxer
The Hon. Wally Herger
The Hon. John Doolittle

September 12, 1997

Randall Sharp, Project Leader
Modoc National Forest
300 West 12th Street
Alturas, CA 96101

Re: Fourmile Hill/Telephone Flat Projects

Dear Mr. Sharp:
The Threat to allow geothermal power companies to construct a power plant in the Medicine Lake Highlands is of great concern to me. CT.1 This area is important to many native American Tribes as a sacred area. CT.2 It also important to the northern spotted owl as well as the California spotted owl.
President Clinton designated the area an old-growth reserve as part of his Northwest Forest Plan because of the ancient forests and the many other species to be found in the area. CT.3
The year round water source would be compromised for a power plant and the needs of well sites, power towers and powerlines will drastically change an area that deserves national monument status to protect the wild character and habitat. CT.4
The last visit I made to Medicine Lake was a stunning experience that I hope to repeat without being assaulted by geothermal development.

Sincerely yours,

Sylvia M. Gregory

Sylvia M. Gregory
141 Madison Ave.
San Bruno, CA 94066

cc. Honorable Dianne Feinstein and Honorable Barbara Boxer
Senate Office Building
Washington, DC 20510
Senate Office Building
Washington, DC 20510

Letter CU

RECEIVED

SEP 8 1997

MHA

Fourmile Hill Geothermal Development Project
Modoc and Klamath National Forests
Glass Mountain KGRA

To ensure that the federal agencies provide the appropriate distribution of future information regarding the proposed geothermal development activities at the Fourmile Hill project area on the Modoc and Klamath National Forests, please:

- Verify your name and address information
- Complete the brief questionnaire
- Return this form to the address printed on the other side of this form (please be sure to affix appropriate first-class postage to ensure delivery)

Name and Address: Mz. Deborah Lynn Gregory-Fisher
P.O. Box 511 Dunsmuir, Calif. U.S.A. 96025-0511
c/o 804 #2 Yuba St.
Redding, Calif. U.S.A. 96001
#916 245-0660

Questionnaire:

✓ Please include my name on all future mailing lists for this proposed geothermal project.

✓ I am not interested in receiving further information regarding the proposed geothermal project; please remove my name from future mailing lists.

✓ I will be forwarding my comments to you regarding the proposed geothermal project.

✓ I have the following specific comments regarding the proposed geothermal project:

Two page opening statement enclosed
Janks, Girl
Deborah Lynn

Signed: Mz. Deborah Lynn Gregory-Fisher
MZ. DEBORAH LYNN GREGORY-FISHER 8/16/97

NO NO BADDOG
PREPARED BY DJG
DATE 8/13/97
Rough + FINAL
1 of 2 ft + bck (2 covers)

Page one back of two cover address
Cal. Pine Corp.

To: Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development
Project EIS/EIR Coordinator
800 W. 12th St.
Alturas, Calif. 96101
U.S.A. 1-707-233-5811

From: Mz. Deborah Lynn Gregory-Fisher
P.O. Box 511
Dunsmuir, Calif.
U.S.A. 96025-0511
1-916-245-0660
c/o 804 Yuba St. #2
Redding, Calif., U.S.A.
96001

RE: RECYCLE (MANDATED) POLICIES AND VEGETATION MANAGEMENT / ALSO WHAT'S THE OUTHOUSE MECHANIC CONSIST OF DUNSMUIR NEEDS A TOILET ♡

Please keep me informed by mail per Phone conversation regarding: Bonneville Corps guilt or lack of it in the line fire vs. equal guilt or lack by the Lumber Corps

CU.1

quoting "There's no linar board feet under power-lines so we don't have to (cut clear) there, it's not cost affective."

Overturning a judgement believed was made in error against Bonnerville Corp. IE. Pole lines are public access.

(B) Please send any and all information regarding & related to the implementaded Recycle Management involved. Per your request I will also contact Cell-Pine Corp. @ the office of Ed Merriken 1-707-527-6700 EXT. 709
P.O. Box 11279
Santa Rosa, Cal.,
USA 95406-1279

CU.2

Please help me appeal the courts decision against Bonnerville Corp. + all other utilities. (Public Accessible) to come.

Lumber Corp.s must be stopped from quoting it isn't worth clearing by

CU.3

NONO BAD DOG
PREPARED BY DPH
DATE 8/13/97
ROUGH + FINAL
1 of 2 fst + brk cover

stating "why bother there's no linar board feet." THIS ISN'T FOREST MANAGEMENT OR FOREST GROWTH BUTT MOST OF ALL IT'S DEFINITELY NOT RESPONSIBLE
Stand out in the middle of no where right next to a powerline cutting trees & say "We done clear there cause it's not cost affective?!"
DOUBLE-DA!

Thanks for your time,
Faith-filled
Mz. Deborah
Lynn Gregory-Fisher
P.O. Box 511
Dunsmuir, Calif. USA
96025-0511
PH# -1-916-245-0660
c/o 804 #2 Yuba St.
Redding, Calif. USA
96001

Back of page two & Cover address
for Cal-Pine Corp.

To: Cal-Pine Corp. c/o
Office of Ed Merrihew
P.O. Box 11279
Santa Rosa, Calif. U.S.A.
95406-1279
1-707-527-6700 Ext. 709

From: Ms. Deborah Lynn Gregory-Fisher
P.O. Box 511
Dunsmuir, Calif. U.S.A.
96025-0511
Ph # 1-916-245-0660
c/o 8024 #2 Yuba St.
Redding, Calif. U.S.A.
96001

"Safety FIRST" Smokeys FRIENDS

RE: Vegetation Management + Recycle (mandated) Policies "2000".
TOILET MECHANIC ALSO DUNSMUIR NEEDS ONE.
Vegetation management under + around pole-lines.
Keep me informed by mail list regarding
Fourmile Hill Geothermal
Bonneville Corp. Project.

Letter CV

SEPTEMBER 28, 1997

RANDALL SHARP
PROJECT LEADER
MODOC NATIONAL FOREST
800 WEST 12th STREET
ALTURAS, CA 96101

RE: COMMENTS ON FOURMILE HILL GEOTHERMAL PROJECT DRAFT EIS/EIR.

DEAR MR. SHARP,

ON BEHALF OF MYSELF, AN INDIVIDUAL, AND WENDELL WOOD OF THE ONRC IN KLAMATH FALLS, OR, I SUBMIT THE FOLLOWING COMMENTS:

I HAVE VISITED THE SITE OF THE PROPOSED POWER PLANT AND WELLFIELD, AND THE MT. HOFFMAN ROADLESS AREA. I HAVE ALSO DRIVEN ALONG THE PROPOSED ROUTING OF THE TRANSMISSION LINE SECTIONS FROM MEDICINE LAKE TO HIGHWAY 139.

1. POWER PLANT SITE AND WELLFIELD

UPON INSPECTION OF THE POWER PLANT SITE, I FOUND AN UNDERGROUND CRACK-FAULT CAVE SYSTEM APPROX 175 PACES FROM THE WELL-HEAD NEAR TRANSMISSION LINE SECTION A3. THIS CRACK-FAULT CAVE SYSTEM IS 8-10' DEEP AND AT LEAST 50' LONG AS EVIDENCED BY CV.1

NEARBY SURFACE DEPRESSIONS. THE CRACK/CAVE SYSTEM HAS GOOD AIRFLOW, AND IS HOME TO AT LEAST 1 FROG, AND OTHER GROUND DWELLING MAMALS. THERE ARE ALSO OTHER SURFACE DEPRESSIONS FOR AT LEAST 1 MILE FROM THE PROPOSED POWER PLANT SITE ALONG TRANSMISSION ROUTE A3.

CONSTRUCTION OF THE POWER PLANT SITE, AND ROADBUILDING ALONG SECTION A3 WOULD ADVERSELY EFFECT THESE CRACK/CAVE SYSTEMS. CAVE-INS DUE TO ROADBUILDING OR DRILLING AT THE POWER PLANT SITE ARE POSSIBLE.

2. MT. HOFFMAN ROADLESS AREA.

THE MT. HOFFMAN ROADLESS RELEASE AREA ALONG TRANSMISSION LINE SECTION A2 IS WORTHY OF WILDERNESS STATUS. THIS IS AN IMPORTANT BIOLOGICAL CORRIDOR FOR SENSITIVE SPECIES, AND IS ADJACENT TO THE GLASS MOUNTAIN SIA AREA. THE SOILS ARE ALSO VERY FINE AND STEEP IN THIS AREA, WHICH WOULD LEAD TO A GREATER EROSION POTENTIAL. THERE IS ALSO A RECREATION POSSIBILITY NEAR THE HOT SPOT, DUE TO THE EXISTANCE OF FUMEROLES AND HIGH QUALITY OBSIDIAN AND FOAM BLOCKS ADJACENT TO THE ROADLESS AREA. CV.2

3. NATIVE AMERICAN CONCERNS

I QUESTION THE STATEMENT THAT THE REQUIREMENT IN THE KLAMATH NATIONAL FOREST LRMP #25-25 WAS WRITTEN IN ERROR. I BELIEVE THAT IF THERE IS A DESIRE TO AMEND THIS SECTION, A PUBLIC COMMENT PERIOD SHOULD BE ESTABLISHED, AND PUBLIC MEETINGS HELD TO ADDRESS THIS ISSUE AND SOLICIT COMMENTS FROM THE TRIBE AND INTERESTED MEMBERS OF THE PUBLIC. CV.3

4. CONCLUSION

BECAUSE OF THE SHORT TERM AND LONG TERM IMPACTS TO SENSITIVE SPECIES SUCH AS NORTHERN SPOTTED OWLS, CALIFORNIA SPOTTED OWLS, FISHERS, PINE MARTENS, NORTHERN GOSHAWKS AND BATS, AND THE OLD GROWTH FORESTS NECESSARY FOR THEIR SURVIVAL, I RECOMMEND THAT THE NO ACTION ALTERNATIVE BE CHOOSEN. CV.4

IF THE NO ACTION ALTERNATIVE IS NOT CHOSEN, THEN THERE SHOULD BE NO CONSTRUCTION DONE INSIDE SEGMENT A2. THE TRANSMISSION LINES SHOULD BE BUILT ALONG EXISTING ROADS AND OTHER UTILITY RIGHTS-OF-WAY ENTIRELY. NO TREE OVER 18" SHOULD BE CUT WHEN POSSIBLE, AND ROADS SHOULD NOT BE BUILT OVER CAVE OR CRACK SYSTEMS. CV.5

THANK YOU FOR REVIEWING MY COMMENTS ON THE PROPOSED FOURMILE HILL GEOTHERMAL PROJECT DRAFT EIS/EIR. PLEASE KEEP ME ADVISED OF ANY FUTURE ACTIONS CONCERNING THIS PROJECT. CV.6

SINCERELY,

KYLE HAINES
P.O. BOX 695
YREKA, CA 96097

CC: WENDELL WOOD
ONRC.

Letter CW

Sept. 15, 1997

Dear Randall Sharp,

I am opposed to the geothermal projects that have been proposed for the Medicine Lake area in Northern California. CW.1 // This area is one of the most pristine wilderness areas we have left, and a critical wildlife habitat. CW.2 // Many areas deserve to be left undisturbed. Please allow this to be one of them. CW.3 // The energy generated by these geothermal projects would not even benefit our state! CW.4

Roadless areas are so rare and this designation is becoming more meaningless all the time. These areas are essential habitat for many predators who roam over a wider space. CW.5 // The Medicine Lake area, as a sacred area to many people and a vital source of water, seems an important site to preserve in its wild and natural state. CW.6

Sincerely,
Barbara Hannelore
47 Amador
Goleta, CA. 93117

Letter CX

9-25-97

Dear Randall Sharp,

I'm writing to protest the Medicine Lake proposed Calpine Geothermal power plant. CX.1

The studies on the long term effects have not been sufficiently done // and // the public has not been given enough time to be made aware of the facts in this case. CX.2 CX.3

Thank you,
Sincerely,

Shelly a. Harmon
40051 Hawkins Mill Rd.
Fall River Mills, CA.
96028

Letter CY

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Dave Harris
Address: 11 Winchester Circle
Lebanon, PA 17046
Phone: (717) 279-7857

Comments: My wife and her family own a cabin at Medicine Lake, and I was very upset to find out that they are trying to pass this Geothermal Project at Medicine Lake. We look forward to spending our summers with her family at the lake. I enjoy fishing and reading by the lake. The beauty and peacefulness is why we keep going back each year. This type of project will destroy everything we keep going back for each summer. It will definitly be an eye-sore and take away from the natural beauty of the area. // Why would anyone want to put this type of project at Medicine Lake when there are so many other places that would be more suitable? // Don't take this away from the campers, the cabin owners, the wildlife and most importantly the children of tomorrow who will want to take their families to Medicine Lake one day. It's time we all stand together to fight this project. I do not believe in it nor will I ever support this project. I want to keep Medicine Lake the way I've always remembered it, quiet, beautiful, and most of all a wonderful family vacation area. CY.1 CY.2 CY.3

Sincerely,
David A. Harris

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter CZ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Neil Harris
Address: 116 Winchester Circle
Lebanon PA 17046
Phone: (717) 279-7856

Comments: To whom It May Concern: My family owns a Cabin at Medicine Lake and I don't believe that they are trying to allow this type of Project to be developed in such a beautiful place as "Medicine Lake". My Children and myself look forward every year to flying out to California to Spend our Summer at Medicine Lake with our family. We look forward to the peacefulness, the beauty, and the many things that Medicine Lake has to offer to our family. By putting in this type of Project it will destroy everything that the lake has to offer and will not be an enjoyable place to go when something like this takes over the area. The beauty of this lake and its surroundings is why we chose to have a Cabin at Medicine Lake. Please do not take this away from my family. Its something we look forward to every year.

CZ.1

A very upset Cabin owner,
Neil M. Harris

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DA

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Ronald W. Hart
Address: 965 Lassen Ln
Mt Shasta CA
Phone: 96067

Comments: It occurs to me that the B.L.M. and the U.S.F.S. are in place to manage our public lands in the best interest of those lands and the public who owns them, and uses them. With ever dropping timber income it makes sense ~~that~~ to look elsewhere for funding to finance the programs to manage and steward our lands. Part of the stewardship obligation is to protect the environmental systems of our delicate lands and the decision to go forward with this and other Geothermal projects in the Medicine Lake area would be a bad one. I dont know what the financial benifits would be for any of these projects but the environmental costs are too great. My family and I have been enjoying Medicine Lake for its unique beauty for many years and will be outraged if any project as detrimental as this is allowed to go forward.

DA.1

Sincerly Ronald W. Hart

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DB

9/29/97

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Sir:

These comments are in reference to the Fourmile Hill Geothermal Development Project Environmental Impact Statement/Environmental Impact Report.

First, I would like to observe that this project is not on mining claims, so there is no legal mandate to approve the project, as there would be under the 1872 Mining Law. I believe that the natural, ecological, recreational, and scenic values far outweigh the possible value of the relatively small amount of electrical energy which would be produced here. The entire character of the area would be changed from its relatively pristine character to heavy industrial use. I have seen the geothermal plant near Mammoth Lakes, and it is not pretty. Therefore, I am strongly in favor of the No Project alternative. I believe that it is in the best interest of the land, and the landowners, us, to select this alternative. DB.1

On Page 1-3 of the DEIS/R is the statement that "(a)s a renewable resource, the project would implement one of BPA's Emphasize Conservation Alternative." This statement is in error -- geothermal steam is not a renewable resource. It has a finite life, in these case stated as 45 years, which is less than the life of many other mining projects. This statement should be corrected. DB.2

If the project is approved, then the alternative selected should be Alt. 6, for the reasons stated in Sec. 2-4. The project would still be very destructive of natural values, but probably anything that can be done to mitigate the destruction should be done. DB.3 Also, there should be more discussion of cumulative impacts. I note that the proposed power line has enough capacity for six 49 MW plants, Either this should be explained, or the size of the power line reduced. DB.4

However, as far as I am concerned, the heart and soul of the document is the Mitigation Monitering and Reporting Program (MMRP). This is the only way that the nice words and promises in the DEIS/R will actually occur. The rule of thumb is that the DEIS/R is 5% of the work, the balance of 95%, which is MMRP, remains to be done. Therefore:

1. Since this project has a finite life, and all equipment is to be removed and the area reclaimed at the end of the project, a reclamation bond should be required from the proponent adequate for reclamation at any time during the life of the project. If power prices go down, if there is mismanagement of the project, or other contingencies, the project may be abandoned before the end of its life, and the taxpayers should not be stuck with cleanup and reclamation costs. The value of the equipment should not be counted as part of the reclamation bond, since the equipment may have no value because of obsolescence, wear and tear, etc. DB.5

2. All of those responsible for oversight under MMRP, such as hydrologists, biologists, archaeologists, botanists and others, must be selected by and paid by the USFS, not Calpine. Calpine should then reimburse the USFS for the cost of these consultants. The consultants must also have the power to shut down the project if there are violations of the MMRP during construction, or after. DB.6

Having these consultants paid by Calpine puts them in the untenable position of risking their jobs if they find and report violations. Not everyone has the courage to be a whistleblower. If these consultants are responsible only to the USFS, and therefore only to us, the owners of the land, there is a much better chance of the MMRP being properly implemented.

3. After construction, all roads not reclaimed should be closed to public use. Roads fragment habitat, and encourage litter, vandalism, and poaching. The less roads, the better. DB.7

Please let me know regarding the decision on this project. Thank you for considering these comments. DB.8

Sincerely,

Stan Haye

Stan Haye
230 Larkspur St.
Ridgecrest, CA 93555

Sept. 30, 1997 **Letter DC**

Mr. Randall Sharp

Dear Sir:

I strongly oppose the proposal by the CalEnergy and CalPine agencies who are going to build power plants in the Medicine Lake Highlands. **DC.1**

I feel strongly that the location of these projects is in an area that poses serious geophysical risks. **DC.2**

The negative impact on the environment, the flora and fauna, the geology, the Native American ceremonial sites and recreation, will change the face of the Medicine Lake Highlands forever. **DC.3**

The power generated will not benefit the citizens of California, who will be paying the price with the environmental destruction of the pristine and unique area. The power will be sold to Oregon. It is obvious that the intent is to take the natural resources put in trust for the people and sell it for a price to the highest bidder. **DC.4**

The location of this project is on public lands. These agencies are supposed to manage and protect these areas for the public good. Instead, BLM and USFS, will decimate this area to enhance their own coffers in complete and utter disregard of the public trust. **DC.5**

A concerned citizen,

Anita E. Henrig

Dear Randall Sharp, **Letter DD**

Please, do not drill at Medicine Lake Highlands! **DD.1**

How could anyone want to degrade one of the only year-round water sources? **DD.2**

Human beings, in many cases, do not care about the environment or other species and yet they should at least care about themselves + Destroy NO more natural habitat, especially water lands. **DD.3**

Thank you for your attention to these matters and this letter.

Sincerely,

Pam HENSON

Pam H

Letter DE

COMMENT FORM

For the Fourmile Hill Geothermal Project

Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Don Herger
Address: % Gen Delivery
Mt Shasta, CA
Phone: 96067

Comments: Sir:
I believe that the Geothermal project should be allowed to proceed.
Geothermal development is the cleanest method of producing power. It is not harmful to the Environment or any other thing.
Do not be swayed by the few, as for the alleged posting of no trespassing or hunting, are deer herds, need all the protection we can give them.
Thank You
Don H

DE.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DF

Robert L. Hickerson
5309 Schulmeyer Rd.
Yreka CA 96097
(916) 842-5589
email roberth@snowcrest.net

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Dev. Project EIS/EIR Coordinator
800 W 12th Street,
Alturas, CA 96101

September 30, 1997

Dear Mr. Sharp:

I attended and made comments at the most recent meeting in Yreka on the proposed Geothermal Project at Medicine Lake. Having researched the impact of energy use on society as an avocation since about 1948 my position is unique. I am in favor of the project. The enclosed research paper by me will give some insight into why. DF.1

Siskiyou county gets its electricity mostly from coal powered plants operated by Pacificorp. Eminent geologist and geophysicist M. King Hubbert was at the forefront of energy forecasting for nearly a half century. He accurately predicted the peaks of world oil and gas production. World oil production will peak in 2005 and it is downhill from there. However in 1956 Hubbert predicted that world coal production would peak around 2156. Based on the historical data, Dr. Richard Duncan of the Institute on Energy and Man has shown that the coal production peak will occur around 2007. Hubbert's coal error stems from a vast overestimate, by a factor of ten or more, of the amount of coal that can ever be practically mined from the earth. Instead of using his method of analysis, he took the Energy Industry's estimate. What this means is that Siskiyou County will be competing for the declining amount of electrical energy that will be available in the future. To deal with this certain and predictable electrical energy crunch I have a proposal. DF.2

Siskiyou County should encourage the development of this geothermal project. The first 49.5 Megawatt plant could supply all of the electrical needs of Siskiyou County for the indefinite future. Siskiyou County should use every means possible, political, economic and legal to insure that in the future it has first crack at the geothermal electrical energy which will be generated. There is the challenge for Siskiyou County, its Air Pollution Control District, the Planning Department, the Board of Supervisors and anybody else who has a vital interest in the Future of Siskiyou County.

Environmentally, geothermal power is more benign than Nuclear or Fossil Fuel power. The concern about loss of tourism will become irrelevant because in the future the increase in the price of gasoline will exclude all but the most wealthy as tourists. For those who have summer homes at Medicine Lake I urge that the visual impact to them be mitigated by routing the power line over the alternate route behind the mountain where it cannot be seen by them. I will be happy to supply additional data to support my position. DF.3

Very truly yours,
Robert L Hickerson
Robert L. Hickerson

In many of his writings, Howard Scott, founder of Technocracy stressed the importance of energy use per person. In his 1933 paper, SCIENCE VS CHAOS Scott wrote. "The history of the human race may well be stated in terms of the ability of man to consume ever-increasing amounts of extraneous (non-human) energy. The limitation and stabilization of that rate of increase is the scientific problem of the not far distant future."

In personal communications with Prof. Ken Watt of UCDavis, Watt stressed the importance of energy use per person. He also said that he and about 100 other scholars "believe that energy and numbers of births will be the two key variables in determining the character of the future. We now feel the planet and humanity can only coexist as a living system for a long time if the human population gets down to 1/70 to 4/70 of the present level. It is difficult to see how to do that without violence..." 1/70 of the present global population is approximately 100 to 300 million people. That's for the whole planet!

L. F. Evanhoe, geologist, geophysicist, engineer, and oceanographer, and a friend of the late M. King Hubbert, in his paper GET READY FOR ANOTHER OIL SHOCK, published in THE FUTURIST magazine for January-February 1997 predicts the date of the Shock. "The critical date is when global public demand will substantially exceed the available supply from the few Persian Gulf Moslem oil exporters. The permanent global oil shortage will begin when the world's oil demand exceeds global production--i.e., about 2010 if normal oil-fields decline occurs, or as early as 2000 if the world's key oil producer, Saudi Arabia, has serious political problems that curtail its exports. World oil production will thereafter continue to decline at a dwindling rate.

This foreseeable energy/oil crisis will affect everyone. Governments will have the highest priorities for transportation fuels during an emergency. A sudden global crude oil shortage of 5% could bring back the gasoline lines of the 1970s--to the American public's surprise and dismay. But this time the oil shortage will be permanent.

Thus the question is not whether but when the foreseeable permanent oil crunch will occur. This next paralyzing and permanent oil shock will not be solved by any redistribution patterns or by economic cleverness, because it will be a consequence of pending and inexorable depletion of the world's conventional crude oil supply. Few economists can bring themselves to accept that the global oil supply is geologically finite.

The global price of oil after the supply crunch should follow the simplest economic law of supply and demand: There will be a major increase in crude oil and all other fuels' prices, accompanied by global hyperinflation, rationing, etc. After the associated economic implosion, many of the world's developed societies may look like today's Russia.---A major change in lifestyles should be expected by the lower and middle classes in all societies. Besides the government (police, armed services, etc.) only the wealthy upper classes will have the money for auto and airplane fuel.---

Those democratic governments in power when the global oil production peaks will all be cast out by their voters unless they have made major efforts to stave off the inevitable fuel crisis.

They have been warned!"

Professor Watt advises everybody to plan their lives as if the price of gasoline will be 100 dollars per gallon in ten years.

And Professor Albert Bartlett of the University of Colorado defines modern agriculture. "Modern agriculture is the use of land to convert petroleum into food." Without Petroleum we will not be able to feed the global population. That is why Professor Watt says, "We now feel the planet and humanity can only coexist as a living system for a long time if the human population gets down to 1/70 to 4/70 of the present level."

Life-Expectancy of Industrial Civilization.

Robert L. Hickerson
August 2, 1997

We are in an emergency situation with regard to energy and fossil fuels. "Since March the 9th, 1933, the United States has been in a state of declared national emergency." I believe that the President will be forced to implement these emergency orders when the crunch comes.

Biologist Wilton Ivie, in THE ECOLOGY OF MAN, writing for 'The Technocrat' magazine Vol. 16, No. 12. in December 1948 and re-issued as a pamphlet in July 1969 wrote, "it is possible for man to remain the dominant species on earth and at the same time enjoy a high standard of living for MANY CENTURIES TO COME." On the front cover of the pamphlet was the qualifier "North America can no longer be occupied by a high energy civilization operated on a haphazard, planless basis. We must plan for survival! " Regarding energy he wrote "We cannot plan to operate for long on fossil fuel as our major energy source. Instead, we must adopt a system of energy use which will obtain a maximum amount of energy from renewable sources and a minimum amount from nonrenewable sources.--The Price System (the World's money systems.) on the other hand refuses to face the problem, but seeks to deplete our limited fossil fuels at the maximum rate that will yield a 'fair return' in the way of profits."

Richard C. Duncan, Ph.D. Of the Institute on Energy and Man in his October 1993 paper SUSTAINABILITY--IS THERE A MIDDLE ROAD? The Transient-Pulse Theory of Industrial Civilization wrote, "In 1962 the eminent geologist M. King Hubbert sketched out what seemed at the time an unthinkably pessimistic prospect; by one path or another, humankind faced an indefinite future of near-zero rates of growth in energy use. Hubbert proposed three steady-state scenarios; I, II and III.--Scenario I the high steady-state, Scenario II the middle steady-state, and Scenario III the low steady-state or transient pulse.", Scenario III is known as Hubbert's pimple.

Duncan says that, "the year of the peak for Scenarios II and III is shown by Hubbert to occur about 2140. However. Historical data shows that we heretofore passed the peak ten to fifteen years ago, i.e., about 1980. Second, Hubbert shows the magnitude of the peak equal to approximately 270 gigajoules per person per year. However, I (Duncan) demonstrate from historical data that the magnitude of the peak is only about 70 gigajoules per person per year. Thus, Hubbert's Scenarios II and III are, perhaps, in error by 160 years in time and by 200 gigajoules (i.e., 285 percent!) in magnitude." Duncan attributes Hubbert's error to his having used the Energy Industry estimates of the ultimate magnitude of cumulative production of world's nonrenewable energy that are grossly exaggerated by a factor of ten or more.

In his 1996 paper, THE OLDUVAI THEORY: SLIDING TOWARD THE POST-INDUSTRIAL STONE AGE, Duncan quotes cosmologist Sir Fred Hoyle, "It has often been said that, if the human species fails to make a go of it here on Earth, some other species will take over the running. In the sense of developing high intelligence this is not correct. We have, or soon will have, exhausted the necessary physical prerequisites so far as this planet is concerned. With coal gone, oil gone, high-grade metallic ores gone, no species however competent can make the long climb from primitive conditions to high-level technology. THIS IS A ONE-SHOT AFFAIR. IF WE FAIL, THIS PLANETARY SYSTEM FAILS SO FAR AS INTELLIGENCE IS CONCERNED. The same will be true of other planetary systems. On each of them there will be one chance, and one chance only." (Hoyle, 1964)

In The Olduvai Theory Duncan tabulates various estimates of the Life-Expectancy of Industrial Civilization. He quotes 12 experts including such notables as Bertrand Russell, J. W. Forrester, Donella Meadows, Richard Leakey and others. The predominant number is about 100 years.

Letter DG

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Shirley Hill
Address: 2107 Pack Trail
Mt. Shasta, Ca 96067
Phone: (916) 926-5559

Comments: Dear Sir

I hope you will re-consider allowing any company to establish a geo-thermal complex in the Medicine Lake Highlands area. DG.1

This area is very valuable as it is, and very fragile. Once it is compromised it would never be returned to its former value.

There are other areas available for geo-thermal development. Why must the Medicine Lake area be destroyed? DG.2

I realize the USFS or BLM wants to make money, but I believe your basic responsibility is to preserve the land belonging to the people in the way that the people want it to be preserved. The majority of the people want the Medicine Lake Highlands to be left the way it is. DG.3

Thank you for your consideration

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DH

Katherine Holmes
511 Reisling Ct.
Manteca CA 95337

September 16, 1997

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing to express my opposition to the Fourmile Hill/ Telephone Flat geothermal energy project. DH.1

The development of a geothermal project in the Medicine Lakes Highland area would be destructive to this old-growth lodgepole forest. // Furthermore with the current deregulation of the electricity industry, the 100 million dollar cost for this facility is not cost effective. DH.2 DH.3

Combine all this with the fact that the energy will be sold to Oregon, makes this a very bad deal for Californians. DH.4

This is a unique and pristine region of California. Lets preserve it for wildlife & future generations! DH.5

Sincerely, Katherine Holmes

510 Sarah Bell
Mount Shasta, CA 96067
September 28, 1997

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
USFS — 800 West 12th Street
Alturas, CA 96101
FAX: 916-233-5817

Dear Mr. Sharp,

We are writing to express our opposition to the proposed geothermal plants in the Medicine Lake area for the following reasons: DI.1

1. Cumulative effects were not studied in the draft EIS/EIR. What would the impact of up to six power plants be on all aspects of the environment in the Medicine Lake Highlands? We do not know! DI.2

2. Since a three hundred megawatt transmission line is being planned, six power plants would be possible. The public is being deceived into thinking that only Telephone Flat and Fourmile Hill are under scrutiny; in actuality, the development might be substantially greater in the future. DI.3

3. Developers are trying to avoid jurisdiction of the California Energy Commission by keeping the plants just under fifty megawatts each. The public and the ecosystem need and deserve more oversight protection of the project by government agencies. DI.4

4. The noise and vibration caused by 24 hour a day drilling for 45-90 days (for each well!) would profoundly disrupt the wildlife in the area. In addition, the high voltage transmission lines, roads and steam pipeline would disturb the pristine ecosystem. DI.5

5. Toxic waste would need to be trucked out the facility to be dumped elsewhere. DI.6 *Money should be spent on building solar and wind generation plants, which don't pollute the environment.* DI.7

6. Several Native American tribes consider Medicine Lake to be sacred ground. They have suffered enough under the domination of the United States government and its people. It is unconscionable to rob them of what little ceremonial ground they have left! DI.8

Additionally, we would like to comment upon the way in which the public was informed about these projects. No meeting was planned in Mount Shasta until citizens insisted upon it. We did attend that Mount Shasta meeting. There were also long delays in getting the EIS/EIR to individuals who wanted to study the document. Avoidance of public input and delaying tactics only weaken the tenuous ties which now exist between the USFS and the public. These tactics backfire by angering community members in Siskiyou County. Let's communicate with more openness and respect in the future... DI.9

Thank you for your consideration of our comments.

Sincerely,

Ana Holub and Richard Lucas

Ana Holub and Richard Lucas

Letter DJ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 30, 1997 to the address listed at the bottom of the page.

Your Name: Calvin Hutchinson
Address: Box 51
Beatty, Ore 97621
Phone: (541) 533-2450

Comments: I oppose of any changes of the Medicine Lake of northern California because of ceremonial sites of Pit, Klamath, Modoc and Shasta tribes past and present.
I'm a full blooded Modoc and a decented of Baston, Bogue and Sear Face Charley
I feel anything that has to do with our tribal ceremonial sites should be left alone because of sacred things & land of the Native American Indians. DJ.1

Thank You Sincerely,
Mon Sept 29, 1997
Calvin Hutchinson

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DK

HYYTINEN ENGINEERING
3400 Kauai Court, No. 205
Reno, Nevada 89509 • (702) 826-3019
Fax (702) 826-3076

September 24, 1997

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project
EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Re: Fourmile Hill Geothermal Development

Dear Randall:

I am writing to voice my concerns about the proposed Fourmile Hill Geothermal Development near the Medicine Lake area. On August 8, 1997, I stopped at your office and requested a copy of the EIS/EIR report for this project. As of today, I am yet to receive a copy of this report, 6½ weeks after I requested it. This delay makes it extremely difficult to be able to properly review the ramifications of this project. But since the comment period is drawing to a close, I feel I need to respond now, based on the information I have been able to gather. DK.1

The first several alternates for the power lines for this project show the power lines to come up from outside the Medicine Lake basin, over the summit and down through the middle of the basin. To me, this is absolutely unacceptable as it would totally change the nature and appearance of the basin area from a unique recreational area to an industrial looking basin. DK.2

Alternates 5 and 6 show the power lines being kept on the north side of the summit, outside of the Medicine Lake basin, following a shorter route than any of the first four alternates. Either of these two alternates look much better than the first four. I cannot understand how it could be a better alternate to expend more money on a longer route, and ruin the pristine nature of the basin by allowing the power lines to run down the summit and through the basin. DK.3

If it becomes the approved route to allow the power lines to come down through the basin, then it should be a requirement that the lines are placed underground so that no power lines are visible either on the summit or in the basin. The developer has already shown that he is willing to spend more money by placing the longer alternates 1 and 2 ahead of 5 and 6. Since this is the case, then it should be no problem for him to expend the additional funds to keep the power lines underground within the basin. DK.4

Another requirement that should be made of the developer is the widening of the one-lane paved road with turnouts to a full two-lane paved road to match the road near the south end of Medicine Lake. I would anticipate that there would be substantially more traffic with larger power company vehicles using this road if the project is approved. DK.5

I am also still concerned about the possibility of air pollution from the proposed power plant and its effect on the forest. It does not appear that the developer is properly addressing this issue to insure that the forest will not be hurt. If this is not done, then I would have to be totally opposed to the entire project. DK.6

Thank you for letting me express my concerns.

Very truly yours,

Roger G. Hyytinen

Roger G. Hyytinen, Principal
Hyytinen Engineering

RGH/jj

Letter DL

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Charlene Jackson
Address: 1026 Homedale Rd
Klamath Falls, Or
Phone: 541-883-2857

Comments: I am speaking for all my relations the Water, the water life, the trees, the land, the winged ones, the four legged, our winged ones, the rocks, glass mountain, air, without all of these where would we be? And on behalf of all of us as brothers & sisters & keeper of the land, lets be real! lets ask ourselfs do you want to rape Mother Earth, and continue to ruin this beautiful mother of ours, for something that will probably ((Destroy all of Us!)) in the long run. DL.1

Some People dont believe in Spirits but believe me they do exist and one way or another they will fight back.

Medicine Lake is our Sacred Grounds we've used here for our own personal Healing, to cleanse our body, mind, and spirit for a long time. DL.2

Its just like maybe when "you" go to church, you feel good about life.

Remember everything here is for a Purpose.

Thank you.

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DM

9-26-97

Randell Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, Ca. 97601

Mr Sharp.

The purpose of this letter is to strongly oppose the proposed Fourmile Hill Geothermal Project located at the Medicine Lake Highlands. DM.1

The area has religious and cultural significance for members of the Modoc Tribe - DM.2

The current process lacks government to government consultation on these projects - DM.3

I am a Modoc Indian & tribal member of the Klamath Tribes - DM.4

Respectfully
Gerald Jackson

Letter DN

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Marjorie Jackson
Address: 4045 Hillyard #1
Klamath Falls, Or 97603
Phone: 541-883-2857

Comments: to whom it may concern: I can't imagine going to a ceremonial site, with all of the desecrations going on within the existing areas. Please with hope + prayers - that all will do everything possible to protect + preserve - what can be done by mankind.
Sincerely Modoc Descendants

DN.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DO

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Tonny L. S. Jackson
Address: 4045 Hilyard Apt 1
K Falls Oregon
Phone: 541-883-2857

Comments: I am 11 years old, I remember when my dad & grandma took us all to Medicine Lake. I was only 6 years old than but it was real pretty. The water was cold and clear. Please save something beautiful for me & my kids. Please don't ruin Medicine Lake. It means a lot to us when we go and pray there. DO.1 DO.2

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DP

4718 Oakshire Ct.
Carmichael, CA 95608
September 15, 1997

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I would like to call your attention to the proposed geothermal project in Medicine Lake Highlands of Modoc National Forest in Siskiyou County. DP.1

The Medicine Lake Highlands is an area containing ancient forest, rare wildlife, and biodiversity values not likely to be found elsewhere. It is my understanding that the Clinton administration designated it as an "old growth reserve". Also this rea is considered sacred by several tribes of Native Americans who still practice their religious rites in this area. DP.2

The proposed geothermal project would devastate this region. Well sites of up to 18 acres, twenty miles of electric transmission lines, clear cutting of forests, new roads with cuts and fills, would destroy the natural quality of the forest. DP.3

For the foregoing reasons the geothermal projects proposed by CalEnergy and Calpine should be disapproved. Please use your authority to save the Medicine Highlands from unneeded development. DP.4

Sincerely,
Del Marjanson
DelMar Janson

Letter DQ

Randall Sharp, Project Leader
Fourmile Hill Geothermal Development
USFS/BLM — 800 west 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing in strong opposition to geothermal development in the Medicine Lake Highlands and in support of the Native American Tribes whose sacred lands are being threatened by geothermal developments. I support the Pit River, Modoc, Klamath and Shasta Tribes in their opposition to these developments which would have devastating impacts on the sacred character of the whole Medicine Lake Highlands; on many individual sites and cultural resources; on the water quality of Medicine Lake and the many springs, creeks and rivers that have their sources in the Highlands; on the animals, their habitats and migration routes; on the trees and plants; on the visual and air quality; and on the peace and natural beauty of the area. DQ.1

I am concerned that the 300 megawatt transmission line has the potential to serve six power plants like the one being proposed as the Fourmile Geothermal Development. The combined impacts are not being addressed in the current Environmental Impact Statement. DQ.2

sufficiently tested the potential hazards to water, air and life according to law. There is no demonstrated need for the project, and no economic feasibility study. DQ.3

We invoke the US Government's Trust Responsibility to the Indian Peoples of this land, the Executive Order on Indian Sacred Sites, the Executive Order on Environmental Justice, the American Indian Freedom of Religion Act, the National Historic Preservation Act, and National Register Bulletin 38 on Traditional Cultural Properties. The environmental document you have prepared states that impacts to Native American cultural values will be significant and adverse. Geothermal development is incompatible with existing long-standing spiritual and cultural uses of the area and its natural resources. The government itself according to its own laws must not permit this development. DQ.4

The Medicine Lake Highlands are a traditional haven to Native American People and have been used as religious, ceremonial, and gathering grounds for thousands of years. They are highly significant to the cultural continuity of the Tribes in Northern California and Southern Oregon.

The 'No Action' alternative is the only right decision regarding this development that would devastate Native American sacred lands. DQ.5

Sincerely,

Jessica E. Jim
signature

Pit River Tribe/Ajumawi Band
name and tribal affiliation

P.O. Box 335 Burney, CA. 96013
address, city, state, zip

(over for petition)

PETITION
OPPOSING GEOTHERMAL DEVELOPMENT IN THE MEDICINE LAKE AREA

We oppose the proposed Fourmile Hill and Telephone Flat Geothermal Power Plants and other foreseeable geothermal development in the Medicine Lake Highlands. The cumulative impacts of these development are incompatible with the Native American spiritual and cultural significance of the area and its natural resources.

The negative impact on the environment, the flora and fauna, the geology, the Native American ceremonial sites, and recreation, would change the face of the Medicine Lake Highlands forever.

PLEASE STOP THESE PROJECTS!

Print Name	Signature	Tribal Affiliation	Address, City, State, Zip
michelle montgomery	Michelle Montgomery	Pit River	Box. 11 Montgomery Cr. CA 96065
Marshall Miller	Marshall Miller	Pit River member	29137 Superior St, Burney, 96013
Jessica Jim	Jessica Jim	Pit River	PO Box 335, Burney Ct.
Donna James Lawker	Donna James Lawker	Pit River	P.O. Box 1204 Burney 96013
Elsie Johnson	Elsie Johnson		Box 1204 Burney Ca 96013
Hester Potter	P.O. Box 161 Montgomery Cr. Ca. 96065		

Please mail BY SEPTEMBER 30, 1997 to: Randall Sharp, Geothermal Project Leader
USFS/BLM — 800 west 12th Street
Alturas, CA 96101

Send copies to:
Senator Barbara Boxer
112 Hart Senate Office Building
Washington, DC 20510

Senator Dianne Feinstein
331 Hart Senate Office Building
Washington, DC 20510

Native Coalition
PO Box 1143
Mount Shasta, CA 96067

Letter DR

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Gerald Johnson
Address: 2933 S. Old Stage Rd
Mt Shasta 96067
Phone: 916-926-5756

Comments: I feel any geothermal development would change the natural of the lake. any unknown problems could occure. // Forest Service & BLM land should be left undisturbed. DR.1 DR.2

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter DS

Dear Randall Sharp:

I write to oppose the proposed Cal Energy + Calpine geothermal projects in the Medicine Lake Highlands. The Highlands are too unique as a natural area to be invaded this way. They should be left intact, both for ecological value + Native americans. DS.1 DS.2

Very truly,
Verna Johnston

CAROLYN D. JONES
ATTORNEY AT LAW
2844 GARBER STREET
BERKELEY, CALIFORNIA 94705
TELEPHONE 548-1090

September 8, 1997

Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project
800 W. 12th Street
Alturas, CA 6101

Dear Mr. Sharp,

This letter is to inform you of my opposition to the proposed development of a geothermal power plant on the Four Mile Hill site near Medicine Lake in Siskyou County, California. Having read the draft Environmental Impact Statement for this project, and having spent 30 summers vacationing at Medicine Lake, I have many concerns about this effort to develop these unique and sensitive National Forest lands. DT.1

First: The draft EIS/EIR acknowledges that the Medicine Lake region will suffer extensive adverse effects as a result of the Four Mile Hill Geothermal project. The project will harm air and water quality, diminish animal habitat, create noise pollution, and impact Native American cultural sites. In light of these acknowledged harms, I prefer the "No Action" alternative proposed in the draft EIS/EIR. DT.2 DT.3

Second: The draft EIS/EIR does not sufficiently account for the cumulative damage to the Medicine Lake region that will result from the planned development of multiple geothermal power plants in the area. In light of the fact that there are at least two more power plants planned for the Medicine Lake area, the Forest Service, Bureau of Land Management, and other oversight agencies should more fully disclose the combined effect that these plants will have on the region. DT.4

Third: Evidence regarding the safety and economic viability of geothermal energy projects is incomplete. While the draft EIS/EIR downplays the risks posed by this project, the EPA is currently spending over $5 million (per well) of taxpayer's money to prevent wells at the Geysers geothermal development from emitting poisonous gas clouds over portions of Lake and Sonoma counties. The significant underproduction of the Geysers geothermal fields also raises questions about whether it is economically sensible to pursue additional geothermal developments without additional research and technological advancement. DT.5 DT.6

Overall, I see no justification for authorizing a risky project that sacrifices the quality of a spectacular portion of land belonging to the American people in order to benefit a handful of energy corporations and their investors. I was unable to attend the recent meetings that were held to solicit comments from the public, and I ask that you accept this letter as my statement of position on the Four Mile Hill proposal. DT.7

Sincerely

Carolyn D. Jones
(Mrs. James Weinberger)

Letter DU

AUGUST 22,1997
CHARLES B. JONES
1549 WILLOWSIDE RD.
SANTA ROSA, CA 95401

RANDALL SHARP

USFA/BLM FOURMILE HILL
GEOTHERMAL DEVELOPMENT PROJECT,
COORDINATOR

800 W 12 TH STREET

ALTURAS, CA 96101

DEAR SIR;

MY FAMILY AND HAVE BEEN ENJOYING MEDICINE LAKE SINCE 1960. THE FOREST SERVICE HAS BEEN DOING A FINE JOB OF REPAIRING THE UNSIGHTLY ROADS AND CLEANING UP THE CAMPGROUNDS AND OLD DUMPS IN THE AREA. IT IS TRULY A BEAUTIFUL PLACE TO ENJOY. DU.1

THIS IS WHY I CAN'T UNDERSTAND THE CURRENT PROPOSAL TO PUT POWER PLANTS IN SUCH A PRISTINE AREA. CLEAN AIR WILL BE POLLUTED WITH POISONS. DU.2 CLEAR AIR WILL BE CLOUDED WITH STEAM PLUMES FROM BLOCKY COOLING TOWERS. DU.3 PIPES WILL SNAKE THROUGH THE FOREST OVER ~~BEAR~~ GROUND. DU.4 HUGE SWATHS OF FOREST WILL BE CUT DOWN SO THAT UNSIGHTLY POWER LINES CAN CARRY SMALL AMOUNTS OF EXPENSIVE TO PRODUCE POWER, AND DU.5 LIGHTS FROM NOISY PLANTS WILL BRIGHTEN THE NIGHT SKY AND SO DIM THE STARLIGHT WHICH IS SO SPECTACULAR UP HERE.

AS A LONG TIME USER OF MEDICINE LAKE AND MEMBER OF A CABIN OWNING FAMILY, I URGE YOU TO NOT LET THESE POWER PLANTS BE BUILT IN THE MEDICINE LAKE HIGHLANDS. DU.6

SINCERELY,

CHARLES B. JONES

Letter DV

806 French St.
Yreka, CA 96097
September 27, 1997

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th St.
Alturas, CA 96101

Dear Mr. Sharp:

I am writing to let you and your staff know that I do not want a geothermal plant in the highlands of Medicine Lake. DV.1

The project is proposed in an LSR with old growth forest that I have personally vowed to try to protect for future generations since we have destroyed so much of our precious old growth already. We must protect all that is left which isn't much. DV.2

I don't have to tell you that LSR's are set aside for the protection of wildlife habitat. I am particularly concerned for the species dependant on old growth forest and corridors linking them to other roadless areas; i.e., martens, fishers, goshawks and spotted owls. Transmission lines, noise from construction, motorized vehicles and the resultant plant are not compatible with the purpose and intent of an LSR. DV.3

Medicine Lake has a long historic Native American heritage -- hence, the name. Our local tribes have lost enough already to the white man's greed and insensitivity. Let this area alone and do not consider it for any other commercial$ purpose$. DV.4

The small amount of electricity generated from this ill-conceived plant will NEVER make up for the IRREPARABLE DAMAGE DONE. DV.5

Instead of sacrificing our NATIONAL HERITAGE for the sake of a few dollars for a few people, let us keep this area safe from destruction so our children's children can enjoy it as the spectacular ecosystem that it now is. DV.6

I would like to hear from you about what the Forest Service, our public servants, intend to do to protect this area from short-sighted geothermal development. Let us work together to find ways to encourage less use of electricity in homes and businesses. So much is wasted and not enough is done to conserve and find alternative sources of energy. Changing our over-consuming life styles would be the first place to start. I'M WILLING -- ARE YOU? DV.7

Marilee Jordan

MIKE KEESEE

Letter DW

11/17/97

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
USFS
800 West 12 Street
Alturas, CA 96101

Dear Mr. Sharp:

I have just learned of plans to develop a geothermal energy project in the Medicine Lake Highlands, and I am writing to voice my opposition to this project. DW.1

In short, the project is not necessary and would sacrifice the unique qualities of the Medicine Lake area for dubious economics. First, deregulation of the electricity market makes the project unnecessary and financially risky. As an energy professional, I have followed developments in the rapidly changing electric market. Currently, the western U.S. is experiencing a glut of low cost power. The availability of this low-cost power makes any large scale energy project highly suspect. Current experience in the Geyser's, the largest and longest operating geothermal project in the USA, shows that geothermal power cannot compete in a deregulated market as existing facilities are "retired" from service. DW.2

Second and more importantly, the proposed project will result in irreparable harm to the Medicine Lakes area. A project of this size and its attendant power lines will severely impact the area's biotic, wildlife and recreational resources. Furthermore the project has the potential of marring Native American ceremonial sits located in the area. DW.3

Just because Medicine Lake has the potential to produce geothermal energy doesn't mean it should be developed, especially if the market doesn't exist for the power and it will result in severe impact on the area. CalEnergy should stick to what it does best -- developing natural gas fueled co-generation plants. And the USFS should look beyond the short-term (and I suspect faulty) economics of this project and kill it before it starts. DW.4 DW.5 DW.6

Please keep me appraised of any project developments, including public notices, EIRs, etc. Thank you. DW.7

M Keesee

4911 8th Avenue • Sacramento, CA 95820 • (916) 455-6477

Letter DX

September 27, 1997

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th St.
Alturas, CA 96101

Dear Mr. Sharp:

Re: Fourmile Hill Geothermal Project

Please know that my family and I, who have long acquaintance with the area that will be affected by the above project, are unalterably opposed to its going forth. DX.1

Our opposition is based on the environmental harm that will result and thge fact that this area has religious and cultural signifigance for Native Americans. DX.2

It is my understanding that the power generated from the project will not even be used in California. DX.3

Please do not put this project into effect. I would appreciate a response from you. DX.4

Sincerely,

Nancy B. Kenyon

1375 Masonic Ave.
San Francisco, CA 94117

10401 NICHOLS LA/PO BOX 443
MENDOCINO, CA 95460-0443
NOV. 1, 1997

RANDALL SHARP/PROJECT LEADER,
FOURMILE HILL/TELEPHONE FLAT PROJECTS
USFS
80 WEST 12th ST.
ALTURAS, CA 96101

MR. SHARP,

I AM WRITING TO EXPRESS MY TOTAL OPPOSITION TO ALL GEOTHERMAL DEVELOPMENT IN THE MEDICINE LAKE AREA. DY.1

SIMPLY BECAUSE THE TECHNOLOGY EXISTS, AND A PROFIT CAN BE MADE EXPLOITING THE RESOURCES AROUND US IS NOT A VALID JUSTIFICATION FOR SUCH ACTIVITIES. DY.2

THE MEDICINE LAKE AREA IS GREATLY UTILIZED PRESENTLY FOR RECREATIONAL ACTIVITIES ACROSS THE SPECTRUM. DY.3 THE FLORA AND FAUNA REMAIN HEALTHY AND ARE VITAL TO MAINTAINING SUCH NATURAL COMMUNITIES DY.4 FOR FUTURE GENERATIONS.

THE BENEFITS OF THIS PROJECT FOR THE WHOLE COMMUNITY ARE NOT SUBSTANTIAL; AND THE IMPACT OF THIS PROJECT WOULD BE SUBSTANTIAL FOR MANY PEOPLE. ECONOMIC GAIN FOR A FEW IS NOT THE PURPOSE OF PUBLIC LANDS. DY.5

I HAVE LIVED AROUND MT SHASTA FOR MUCH OF THE LAST FIFTEEN YEARS, AND WILL BE RETURNING TO THE AREA TO SETTLE PERMANENTLY AND BUILD A HOME. THE FUTURE OF THIS AREA IS IMPORTANT FOR ME PERSONALLY. I HOPE TO SEE IT REMAIN AS UNDEVELOPED AS POSSIBLE; WHILE ACKNOWLEDING THE NEED FOR JOBS AND INCOME, I CANNOT SUPPORT PROJECTS THAT TAKE RESOURCE BENEFITS AWAY FROM LOCAL COMMUNITIES. THANK YOU. DY.6

Sincerely,
Daniel Kiely
Daniel Kiely

Letter DZ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

Ve value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ubmit any comments at the close of the public hearing or send comments by September 16, 1997 o the address listed at the bottom of the page.

Your Name: Bill and Lette Kinyon
Address: P.O. Box 66
Fall River Mills, CA 96028
Phone: (916) 336-6326

Comments: My husband and I started taking our children to Medicine Lake camping 45 years ago. At that time camping was allowed at lake side and it took 3 hours driving from highway 89 to reach the lake. Every year we spent one week with our children, then our grandchildren and now we are taking our great grandchildren. This is, I am sure, part of the basis for a good, clean and prosperous life they all have. The Fourmile Hill project will put an end to a quiet and enjoyable outing for many families. The lake will be polluted and/or drained and no more wild life will be seen. The forest service employees seem to forget that all of "us" own that lake and land and it has a great lot of history for the Native Americans that will be destroyed. DZ.1 DZ.2 DZ.3 DZ.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EA

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

Ve value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ubmit any comments at the close of the public hearing or send comments by September 16, 1997 o the address listed at the bottom of the page.

Your Name: DIANE Kinyon
Address: 1938 Chestnut St
Redding CA 96001
Phone: 241-1974

Comments: This project will irreversibley damage a Sacred, wilderness area. This land has been protected and cherished by local natives as well as Indian brothers & sisters.
The lake has great traditional meaning to the Intermountain Culture & provides a healthy environment for wild life, plant life & nature to exist in Harmony. Don't Rape Medicine Lake! EA.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EB

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Harry Kraft
Address: P.O Box 123
Danville, CA 94526
Phone: (510) 256-7624

Comments: As a frequent visitor to the Mt. Shasta region, I am opposed to the Fourmile Hill Geothermal Project. // From what I've read, there seems to be some question about the full extent of the development - I've read that there may be as many as six generating plants. If this is the case then the environmental impact report should cover them all and development should not be allowed to start until it is determined that the area will not be damaged. // The USFS and BLM should be protecting our natural areas - not giving them to developers. I would rather learn to be less dependent on electricity than to see this beautiful natural area defaced.

EB.1

EB.2

EB.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EC

9/28/97 To R. Sharp for file

Diane Henderson-Bramlette
Forest Supervisor
Modoc National Forest
800 West 12th St.
Alturas, CA 96101

Dear Diane,

I would like to comment once again on the proposed Medicine Lake Geothermal Project. I would like to state my opposition to this Project and state in detail the rational for my opinion (which I firmly believe is well founded). I would also like to state the several areas of study that I feel may be overlooked in the EIS but .....

EC.1

why?

Sincerely,

Tom

Thomas F. Krauel
1203 Thomason Ln
Alturas, CA 96101

Letter ED

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please omit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997 the address listed at the bottom of the page.

ur Name: DAniel S. KuHN
ldress: 631 ChesTnut St
one: (916) 926-5670

mments: It's not a good idea on the scenery and the enviroment and seizing medicine lake is unspoiled for now but the power plant will ruin the enviroment and everything around it like wildlife and people will not go to enjoy the loops of a 90' feet power plant. don't need such a destructive thing at all on Usforestland and Burel of land Management you specialized people suppose to protect the land that us tax payers pay to protect land such as national forest and monuments and states lands and Deserts and trees lakes canyons rock formations and plants and animals please help save the area and the lake itself and the land around it. ED.1

Sincerily yours
Daniel S. Kuhn
Daniel S. Kuhn

you wish, you can mail your comments to:
r. Randall Sharp
SFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
0 W. 12th Street
lturas, California 96101

Letter EE

9-24-97

Dear Mr Sharp,

I have recently learned of the plan for geothermal development in the Medicine Lake region. I oppose this type of land use in this area. EE.1
This project would result in unnecesary damage to public trust lands while providing limited economic benefits to the government. The addition of power lines and generation plants will result in the degradation of recreational, scenic and wildlife values. The project is not the best use of our public lands. EE.2

Sincerely,
Mark
Mark Langner
POBx 581
Bridgeport CA 93517

Letter EF

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Bill LARSEN
Address: 1008 W.A. BARR Rd.
MT. SHASTA, CA 96067
Phone: 916 926 3870

Comments: As an Owner of a large B&B in Mt. Shasta I am constantly in Contact With Tourist in Our Area and since we have lost so much Revenue from logging it is Very important to preserve Our wilderness type area to attract more tourists. It would be a crying Shame to put this generation Float in an area as beautiful and wild as Medicine Lake Basin. I am sure that there are quite a few Geothermal areas in Siskiyou County that would not have a negative effect on The Environment. Please help us Preserve this wonderful Area and let these folks do Their Research Somewhere else.

EF.1

EF.2

EF.3

Thank You

Bill Larsen

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EG

September 16, 1997

Randall Sharp
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Subject: Four Mile/Telephone Flat Projects at Medicine Lake.

Dear Mr Sharp:

Please deny the geothermal projects proposed for the Medicine Lake area. These proposals are an outrage and are certainly not in the best interest of the US taxpayers or the environment. Please act to presevere and protect our public lands - not conspire to destroy them. Please deny these projects. Also I support an end to logging on our public lands - "not one more ancient tree must fall on our National Forests!" EG.1

David Leavitt
127 Rathburn Way
Santa Cruz, CA 95062

Letter EH

Kobi Ledor, M.D. and Casey Kim
337 Alpline Dr.
Mt. Shasta, CA 96067

9-29-97

Randall Sharp
Project Coordinator
Four Mile Hill Geothermal Development Project
800 W. 12th St.
Alturas, CA 96101

Dear Mr. Sharp:

As concerned citizens of Siskiyou County, we urge you to make sure that the cumulative impacts of the Four Mile Hill, Telephone Flat and Mt. Hoffman projects be addressed in any EIS/EIR. EH.1

Sincerely yours,

Kobi Ledor, M.D.

Kobi Ledor, M.D.

Casey Kim

Casey Kim

Letter EI

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please bmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ur Name: Nik M Lottunich
ddress: P.O Box 2335
Los Gatos CA 95031
one: 408-994-5116

Sun Garden Packing Co.
1582 So. First St.
P.O. Box 6180
San Jose CA. 95150-6180

omments: I am not against Geothermal Power and am aware of the limited areas in which Ample supplies are Harvestable.
I am against the proposed Powerline Running along the north side of Medicine Lake.
From Attending a Geothermal meeting in Klamath Falls. I understand Cal Pine proposed To Run the power line away from the Lake and follow the 7 mile Road. EI.1
Please Do Not allow the Powerline to Run near Medicine Lake Basin

Thank You
Nik Lottunich

you wish, you can mail your comments to:
r. Randall Sharp
SFS/BLM
urmile Hill Geothermal Development Project EIS/EIR Coordinator
0 W. 12th Street
lturas, California 96101

Letter EJ

August 19, 1997
1145 Neotune Way
Mt. Shasta, Ca.

Dear Mr. Sharp:

I want to express my strong opposition to the geothermal projects being considered in the medicine Lake Highlands. A more unsuitable place couldnt be imagined. Not only will you be building in a caldera (and the danger of triggering volconic reactions) but no project has ever been built where there's snow -- and this area gets alot of snow. You are trending on dangerous ground when you butt heads with Mother Nature. EJ.1 EJ.2

There is an overabundance of these plants now & many are being closed -- once again a much touted system is failing to live up to expectations. EJ.3

Most glaring, is the fact this energy wont even stay in calif - it's pegged for Oregon. EJ.4

DO NOT DESTROY THIS SACRED AND BEAUTIFUL LAND!! EJ.5

Sincerely,

Laraine Lewis

Laraine Lewis

Letter EK

COMMENT FORM

For the Fourmile Hill Geothermal Project

Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Kathleen Linden
Address: P O Box 500
Mt Shasta CA 96067
Phone: 926-5118

Comments: A great project for an economically depressed County! Relatively clean, environmentally safe & needed for future energy requirements.

Please proceed! EK.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EL

9/18/97

Please register my strongest opposition to planned geothermal development in Medicine Lake Highlands .. please consider your alternatives.

Mitch Lorenz
Sacramento Ca

EL.1

Letter EM

9-12-97

Please keep us on the mailing list —
Thank you —

EM.5

Draft Environ ... eport

We value your comments o[redacted] nal Project. Please submit any comments at the [redacted] eptember 16, 1997 to the address listed at the b[redacted]

ARICEPT (donepezil HCl)

Your Name: Pete & Laurel Lorenzen
Address: 408 Day Road
McArthur CA - 96056
Phone: 916-336-5843

Comments: We wish to go on record as being opposed to the proposed Fourmile Hill Geothermal Project - We are opposed to all Geothermal exploration & exploytation in the Medicine Lake Caldera. — EM.1

You people have proven there is no need for these proposed projects - Power plants are closing because they have no market for their Power. — EM.2

B.L.M. and U.S.D.A. (Forest Service) are supposed to be stewarts of our Public lands - You are paid with TAX Dollars. We the people are tax Payers also owners of Public Lands - I have been to 3 Meetings on proposed Geothermal Projects - I have heard only 2 people from the audience speak in favor of this exploytation - I would say the vast majority of "We the people" are against this folly. — EM.3

STOP - think of the future - deny these proposed trashings of one of the most beautiful areas in the Western U.S. — EM.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EN

Laura Louttit
382 Trialee Lane
Alameda CA 94502
510-521-3755
Sept. 3, 1997

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I strongly oppose both the CalEnergy and CalPine geothermal projects // The power generated from these projects will be sold to Oregon, leaving California with the environmental and cultural costs of usual blight, habitat loss, and infringement on religious practices of Native Americans. This hardly seems fair and just. // Please do what you can to oppose these projects. Protect California's last stands of wilderness. Thank you for your attention to this matter. EN.1 EN.2 EN.3

Sincerely,
Laura Louttit

Letter EO

Sept. 28, 1987

Mr. Randall Sharp
BLM - Geothermal
Alturas, CA 96101

Dear Mr. Sharp

Proposed action alternatives A1, A2 and D1 are visually and environmentally unacceptable because of their negative impacts in the Medicine Lake Highlands. The already diminished wildlife and the stressed shrubs and flowering plants that produce feed needed for all species, will be further threatened. EO.1

That the projects could be found to be of "no significant impact" to the areas concerned indicates complete ignorance of the fragility of the Medicine Lake area. EO.2

There is but one alternative route for each project that shows the application of logic. CalEnergy's proposed Telephone Flat Power Plant and Wellfield, which should be an independent entity proceeding from the power plant to D2, B2, to the COPT transmission line.

Calpine's Fourmile Hill Project, also as an independent entity, has suggented a route A3 from the Proposed Power Plant and Wellfield, east on A5 and B1, to the COPT transmission line. EO.3

As independent entities, each project would be protected from major damage from wind, lightning or wildfire that caused serious damage to the other project.

The routes numbered A1, and A2, should be eliminated from consideration as possible powerline passages FOREVER. EO.4

The BLM, protector of our public lands, had made it possible for the Medicine Lake to be carefully studied to determine whether it can be an adequate source of geothermal energy--power to the people. The study has indicated that there is a power resource estimated to be adequate to last 50 years--but with how many wellfields and power plants in operation? EO.5

With the studies of two projects nearly completed and approved, it is time to plan for the future. One way to approach a solution would be to lock up the area until Medicine Lake Highlands' little dab of energy is really needed. When that time comes, with proper plans and procedures in place, development should progress without devastation of the area. EO.6

Think about it! Perhaps CE General Corp. can be stopped before their proposed plans of development in their Glass Mountain Unit go further.

Thank you for the opportunity to express my concern.

Yours Truly,
Natalie Macy
Natalie Macy,
Rt. 2, Box 184, Tulelake, CA 96134

NOTE: I HAVE USED THE ROAD NUMBERS FROM YOUR FIGURE 5 AS AS ENCLUDED IN YOUR 5/20/97 LETTER.

Letter EP

August 22, 1997

Mr. Randall Sharp
Fourmile Hill Geothermal Project.
800 W 12th. St.
Alturas, Ca. 96101.

Dear Mr. Sharp:

As a former resident of Lake county,Ca. having lived in a community near the Lake and Napa county geothermal fields, I fell qualified to comment on the Fourmile Geothermal project. EP.1

Costs to the Lake and Napa counties in terms of land destruction and lowering of water and air quality more than offset any financial gains that might have acrued to the counties.

The developers of the Lake and Napa counties geothermal fields fullfilled all the necessary environmental requirements(EIR, etc), but no authority was put in place to patrol and cite offenders. As a result the surrounding communities suffered from the lowered air and water quality. The communities often suffered from disagreeable and toxic quantities of hydrogen sulphide in the air...a well known toxic gas. EP.2

Several concerned citizen groups formed to challenge the developers, insisting that the geothermal fields adherr to required controls. No action was ever taken. In my experience the developers were less than considerate of citizens' complaints.

In view of past performances of the geothermal industry, it would seem prudent to curtail further development of Fourmile Geothermal Project until all the facts can be investigated.

Very Truly Yours,

Maurice J. Maggiora

Maurice J. Maggiora

Velma F. Maggiora

Velma F. Maggiora

Maureen F. Maggiora

Maureen F. Maggiora.

Letter EQ

Ron Maire
512 Lennon St.
Mount Shasta, CA 96067
Phone/Fax (916) 926-6150

9/26/97

Mr. Randall Sharp USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street, Alturas, CA 96101

Re: Fourmile Hill Geothermal Development Project
Environmental Impact Statement
Environmental Impact Report

Dear Mr. Sharp,

I found the Environmental Impact Report to be a vary scholarly document but it does not address the reality of Geothermal field conditions that I personally have experienced. I make that statement based on over thirty years as an process engineer and equipment supplier to the major geothermal power producers through out the world. The last seven years of my career prior to my retirement four years ago, I was extensively involved with Flour Corporation, Unical Geothermal Division with process equipment design, installation, start up and operation of design, The Calipatra California 350 MW geothermal power plant and the upgrade of the 50 MW plant as well as the new production wells adjacent to the Salton Sea. I provided equipment and service to all the other plants in the area, Red Hill Geothermal and Magma Power Company in Calipatria Calif And San Diego Gas and Electric in El Centro. I urge you to investigate for yourself the problems the Calipatra geothermal problems which resulted to some of the environmental disasters the operators have covered up. EQ.1

I have concern a geothermal power plant of only 49.9 MW can be economically feasible under the best of production well production of geothermal resources. Unical and Fluor feasibility studies indicated small power generation plants where not economically feasible and a minimum of a 350 MW plant with geothermal production wells to support was required even with increased government support to justify building such a plant. (San Diego Gas and Electric shut down their small generating station which was a 50 MW plant in El Centro just because it was two expensive to operate. EQ.2

Unical's plants and production wells were automated to insure protection of the environment with leak detectors, telemetry, automatic well shut in valves, overpressure and temperature protection. Three years ago or so, Unical ended up selling there plants in Calipatria as well as all their world wide geothermal properties because the operation and maintenance costs precluded EQ.3

there making a reasonable return on there investment unless the changed their environmentally responsible construction, management and operating practices. The would have to change to the "poor boy" modis operandi as they say in the business, no leak detection at the well head or brine transmission lines, no automatic well kill valves and telemetry, skeleton operating crews, as do many of the other plants in the area. I have been in and serviced such "poor boy" plants and personally observed the results of such an operation to the environment which included massive die offs of White Pelican and fish in the adjacent Salten Sea and land sterilization do to ruptured brine lines with no containment burms to prevent massive spills.

It's bad enough to put such a plant near the Salten Sea which is bounded by desert and agricultural land with little or no aesthetic appeal but it is quite another matter to locate such a proven high risk geothermal series of plants proposed in one of our nations natural unspoiled treasures as the Medicine Lake Highlands in the Modoc and Klamath National Forests and the pristine Medicine Lake which is such a tourist attraction as well. The birds and wild life in the area including the spotted owl, an endangered species, abound in the area. Medicine Lake has such historic Native American heritage dating back for over 9000 years or more. It is unbelievable that table S-5 of the Executive Report lines 4.5 through 4.6.6 indicate little, small or no impact on Native American Spiritual, Cultural values yet in the body of the report page 4-71 lines 5 and 6 states quote,"The proposed project would therefore potentially result in an unavoidable significant impact." EQ.4 EQ.5 EQ.6

I certainly am not an expert in the area of geothermal field potential and certainly the contributing consultants listed have impressive credentials. I have no question there is geothermal resources in the Medicine Lake field but it is what they are not telling us that has me concerned. It is my perception based on a report by College of Siskiyou lecture I enjoyed on Vulcanism in the Medicine Lake caldera and Mt. Shasta that there is probably more than enough geothermal brine to support many or much larger plants, unprofitable as they will be without Government support, and we will have destroyed a national treasure trying to tap a very expensive uncompetitive resource. In my thirty eight years as a process and application engineer all types of process plants and systems from major refineries all over the world, sugar refining plants, power plants of every size, to the Alaska Pipe Line the geothermal plants have the highest maintenance and operating cost of all by a factor of at least five! Now if the 50 MW plant is feasible BLM is giving our resource away and the plant must be a "Poor Boy" operation if we in the business have learned anything at all. EQ.7

Some technical concerns I have based on the limited information in the report. First on page 4-44 paragraph 4 states the estimated fluids available for reinjection is 83.6%. It is my recollection reinjection in the Calipatria Field had to be EQ.8

increased to the 90% plus level to stop subsidence. BLM better check this out very carefully.

Evidence this project is such an environmental gamble is the brine content is not available because the exploratory wells have not been completed. There is no guarantee that the geothermal fluid will be mostly steam an water with a small amount of brine. The chance that the brine could have a lot more solids making it much more erosive and corrosive and expensive to handle especially with the high probability of toxic substances as arsenic found in many geothermal fields. EQ.9

It is disturbing that the potential reservoir thickness and rock porosity has such wide variables on page 4-46. Statements like "can be roughly estimated" on line two of the last paragraph and "simple estimation" on line two of the first paragraph on page 4-47 and statements like "The amount of electricity produced by the proposed project is subject to confirmation drilling and may be less than 49.9 MW" the last point under the title "Increase the Effect of the Project" is of further concern and raises the stakes in this gamble with this Natural Treasure of the Medicine Lake and the Medicine Lake Highlands. What will happened when the project is abandoned and who will pay to clean up and restore the area? On page 4-48 paragraph 5 starting on line 3, "If there are any long-term effects to the reservoir, the BLM *may* require the developer to make appropriate changes to operational procedures, including production and injection rates and location. These requirements would ensure that effect of fluid injection on the geothermal reservoir would be less than significant." In the first place "may" in the sentence must be changed to"will". "The BLM will require the developer---------. The question is does the BLM have a person or persons who has vast experience in dealing with geothermal reservoir management and I don't mean an academic, but an experienced field superintendent that has been on the other side and knows all the tricks developers use to hide their problems such as arsenic finding its way into the ground water or wells running dry as a result of fractures in the supposed clay formation that sealed the ground water from the geothermal fluid because of uneven subsidence do to reduction in the reinjection levels. If you think this can't happened we can give you examples of both even though the geologist said it was not possible! EQ.10 EQ.11

Decommissioning is of great concern. Companies are going bankrupt or being bought out and plants have been closed an wells have been shut and the plants just sit and rust and become a real hazard because no untouchable decommissioning fund has be set up. EQ.12

I could go on but I have listed some of the significant items. I still have problems with so many items in the Executive Summary that are at odds with the main body of the Environmental Impact Statement and Impact Report. What purpose does the report serve when the Executive Summary ignores the substance of the report. EQ.13

The average citizen is so intimidated with the size and complexity of the report they read, very probably, only the summary. I allege it is dishonest to identify the "Executive Summary" as a summary. It is not s summary but an Executive Position!

In the view of the major players in the geothermal business without Federal price supports, which seem to be phasing out, there is more energy and cheaper energy in new natural gas and untapped coal reserves. New clean burning high sulfur coal technology is now coming to market, (Pyropower in San Diego is the leader in the US) The US has huge known reserves in coal and gas which are a much more attractive and productive investment. Before retirement I was involved in projects involving Pyropower clean burning coal projects as well as pipeline projects from new gas fields so I know first had of what I write. I also know first hand Geothermal is just to expensive to produce with the necessary environmental safeguards to now be competitive and the need for government support for alternative energy support is behind the curve considering these new energy opportunities. Tax money to support these Geothermal projects will be very unpopular with the voters when the truth is known. I sight Unical, a major energy company, move to divest it's interest world wide in geothermal energy to prove my point. EQ.14 EQ.15

I will be looking with concern and great anxiety with your decisions and presume you will manage the citizens land in the best interest of all US citizens.

Thank you for the opportunity to make my comments.

Sincerely,

Ronald A. Maire

Ronald A. Maire

cc/ Senator Barbara Boxer
Senator Dianne Feistein
Represenative Wally Herger
Governor Pete Wilson
Supervisor Laveda Ericksen

September 15, 1997

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th St.
Alturas, CA 96101

Dear Mr. Sharp,

I oppose the CalEnergy and CalPine geothermal projects proposed for the Medicine Lake Highlands. This area is important as an ecological link between the Cascade Range and the Modoc Plateau, and should be preserved for its natural character. It should be a national monument. ER.1 ER.2

There is too little wild, ancient forest like that of the Medicine Lake Highlands left in California. I beg you to prevent its destruction/degradation by the proposed projects. There must be other sites for power plants. Please find them. ER.3 ER.4 ER.5

Sincerely,

SGMandel

Stephanie Grace Mandel
10730 Alta St.
Grass Valley, CA 95945

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Lea Mere
Address: 506 LeBaron Dr.
Mt. Shasta, Ca.

Phone:

Comments: This project's effect is enormous to our wonderful Medicine Lake Area. It infringes on all that the Sacred area stands for. It most certainly will put the entire area out of balance. It has far lasting effects of destructive possibilities. ES.1
It most certainly isn't a project in that area for the highest good of all concerned.
This is a reason why it's called Medicine Lake — Healing area for all who come, human and animal alike. It is life supporting.
Respectfully yours
I am opposed to the Geothermal project in that area ES.2

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

OCTOBER 03, 1997

RANDALL SHARP
PROJECT COORDINATOR
800 W. 12TH ST.
ALTURAS, CA 96101

DEAR RANDALL SHARP:

I AM REALLY DISGUSTED WITH THE ARTICLE IN THE HERALD AND NEWS FROM KLAMATH FALLS, OR. I CAN NOT BELIEVE THAT SOME BIG BUSINESS HAS THE GUTS TO JUST TAKE OVER THE MEDICINE LAKE AREA WITHOUT EVEN CONSIDERING THE CONSEQUENCE TO THE ENVIRONMENT. I AM ALSO JUST BLOWN AWAY BY THE FAST THAT THEY DO NOT INTEND TO DO ANY ENVIRONMENT IMPACT STUDIES AND THEY HAVE NOT EVEN DRILLED TO SEE IF THERE IS ANY GEOTHERMAL RESOURCES AVAILABLE. OBVIOUSLY THEY THINK THAT THEY CAN JUST BUILD IT AND HOPE TO SELL BECAUSE AS OF YET THEY DO NOT EVEN HAVE A BUYER. IF THEY THINK THAT THEY CAN JUST SNEAK ONE POWER PLANT IN AT A TIME AND NO ONE WILL NOTICE THEY ARE SADLY MISTAKEN. ET.1

I HAVE BEEN TO MEDICINE LAKE TO SNOWMOBILE. I ENJOY THE UNTOUCHED BEAUTY THAT MAN KIND HAS LEFT ALONE. THERE ARE NOT MANY LAKES THAT I KNOW OF THAT ARE UNTOUCHED. UNLIKE, LAKE OF THE WOODS WHICH HAS A STORE AND A GAS STATION, MEDICINE LAKE HAS ONLY ITS BEAUTY. IT IS THE ONLY PLACE THAT I KNOW OF WERE YOU CAN SEE THE WILDLIFE THAT YOU DO NOT GET A CHANCE TO SEE EVERYDAY. ET.2

THE USFS/BLM HAD BETTER STOP AND THINK OF WHAT THEY ARE DOING BEFORE IT IS TO LATE. IT IS THE TOTAL DISREGARD FROM THESE AGENCIES THAT JUST MAKES ME SICK. I HOPE THAT MORE OF THE PEOPLE THAT WILL BE AFFECTED SPEAK OUT TO PROTECT THE MEDICINE LAKE AREA. I ALSO HOPE THAT THE USFS/BLM REALIZE THAT IT IS PUBLIC LAND AND WE HAVE A RIGHT TO SAY WHAT WILL BE DONE OR NOT. ET.3

SINCERELY,
Dawn Markee
DAWN MARKEE
KLAMATH FALLS, OR 97603

Letter EU

Frances V. Martin
5711 Denny Avenue
North Hollywood, CA 91601

September 15, 1997

Randall Sharp, Project Leader
RE: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

Please, no more power plants in California, especially not in the Medicine Lake Highlands of our Modoc National Forest. EU.1

Our national forests are our national treasures, to be held in sacred trust for our children and theirs, yours and mine. We do not have the right to destroy them for any reason, and most certainly not for profit! EU.2

We must preserve what natural beauty we have; God knows it's disappearing already at an alarming rate! And the last thing mankind anywhere needs is another power plant!

In all sincerity,

Frances Martin

Letter EV

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Shari Mazzini
Address: 21862 Second St
Burney CA 96013
Phone:

Comments: I am against the proposed development of the Fourmile Hill Geothermal Project because I don't feel it would significantly lower any ones power bills or create a larger power supply that is more efficient. EV.1

What I do think the purpose of the plant will be is to make a lot of money for a small group of people much to the detriment of the Redrock Lake area. When (or if) it ceases to be profitable I feel it would end up an abandoned eye sore. EV.2

The Medicine Lake country is gorgeous and enjoyed by many. As a lifetime resident of Burney, I have had the good fortune to visit many times and experience the beauty of it. EV.3

Please consider these comments in making decisions regarding the Fourmile Hill Geothermal Project. EV.4

– Shari Mazzini EV.5

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EW

September 30, 1997

Randal Sharp
USFS/BLM
Fourmile Hill Geothermal Project EIS Coordinator
800 W. 12th Street Alturas, CA 96101

RE: Fourmile Hill DEIS

Dear Mr. Sharp,

The Fourmile Hill Geothermal Project should be approved with the stipulations identified in the draft Environmental Impact Statement. The stipulations more than off set any significant impacts the project may have on the environment, cultural resources and recreational opportunities of the surrounding Federal forest lands. EW.1

This project when developed will help to off set the need to build more fossil fuel power generation facilities in the region. Geothermal power plants when compared to other energy sources on a pounds of pollution per megawatt of output basis produce 1/1000th of the emissions of a gas fired power plant and 1/10,000th of the emissions of a coal fired power plant (Goddard and Goddard, GRC 1987). EW.2 // Also this project will feed into the Bonneville Power Administration Malin substation. The delivery of this power to Malin substation will help to free up valuable Columbia River water by negating the need to deliver an additional 49 MW of power to California from the Columbia River hydroelectric system. This water can be used for salmon by-pass of the turbines and help with the recovery of the endangered Snake River salmon. EW.3

The development of this project will be incompliance with the Presidents Forest Plan and the Geothermal Steam Act. EW.4 // The developer will be required to pay a royalty of 10% of the gross value of the steam. This royalty will be paid to the Federal Government and half of this royalty will be returned to the State and County of origin. This project will generate more revenue per year for the Federal, State and County governments then the entire timber receipts of the Klamath National Forest for 1997. With the significant decline in timber revenues from the National Forest, this project will help to offset the negative impacts of lost of timber revenues on Siskiyou County and the Federal treasury. EW.5

Sincerely,

David W. McClain
9023 SW 176th Ave
Beaverton, Oregon 97007

Letter EX

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~15~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Maria McClowd
Address: PoBox 61
Hot Creek 96540
Phone: (916) 335 4122
Pomd

Comments: I oppose this because I dont want to breath in any more polution than I am already I wants live a long life and see nice lakes so I oppose. EX.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter EY

Sept. 1, 1997

Dear Sir:
I would like to obtain a copy of the DEIS of the Four Mile Hill Geothermal Development Project near Medicine Lake and the Telephone Flat Project. EY.1
Thank you.

R. C. McClymonds
3848 HOLLISTER AVE.
CARMICHAEL, CALIF.
95608

Letter EZ

Sept 26, 1997
PO Box 412
McArthur, Ca. 96056

Dear Randall Sharp,

The unknown factor of exactly where the underground waters go. How far away might some one lose their well water.

The U.S. geological survey determined with the use of blue dye in the water of Crater lake, Oregon. The dyed water came out in springs of Fall River Valley. EZ.1
Crater lake Oregon is a long way from here.
But Medicine lake is very near.

It has been a spiritual place for the Indians as far back as our family remembers. We have been here since before the turn of the Century. EZ.2

And there has always been the freedom for fishing hunting hiking camping for everyone. EZ.3

Of course we are opposed. EZ.4

Thank you
Joan McClymonds
and family

Letter FA

9/16/97

Mr. Sharp,

I oppose the CalEnergy and CalPine geothermal projects // These projects are way out-of-scale for the affected area. Industrializing the Medicine Lake Highlands is exactly the wrong management direction to take. You should be trying to preserve this area's wild and remote character. You should recommend the Medicine Lake Highlands as a National Monument because of its many unique features. Turning the area into an industrial zone is tragic. My family visited Medicine Lake two years ago and we were looking forward to returning. If these projects go forward, we will go elsewhere. // Sincerely, Bob Mc[illegible]

FA.1

FA.2

Letter FB

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Robert Medley
Address: 910 Sierra Vista
Redding, CA 96001
Phone: 916-243-8193

Comments: Medicine Lake is a very special and pristine recreational area that has miraculously maintained its balance with nature up to 1997. The survival of this natural resource has occurred primarily for two reasons: (1) It's remote location and long distance to any sizeable populated area. (2) It's total lack of commercial development. There is no electricity, no telephones, not even a grocery store. This raw undeveloped state has been key to its preservation. FB.1

The proposed Geothermal Project is big-time industry. It will change the Medicine Lake area forever. It will tilt the balance of nature. You cannot pour hundreds of millions of dollars into an area for industrial development without affecting a significent change. // To label an energy source as "green" as justification to permanently alter a pristine recreational jewel is not correct or fair. // I am strongly opposed to the entire proposed project. (Alternative?) FB.2 FB.3 FB.4

I have been going to Medicine Lake for 15 years and am now a cabin owner. It has a "spirit of soul" feel that is so incredibly rare in today's world. FB.5

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter FC

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page. 9-22-97

Your Name: JOHN W. MIKEC (Family)
Address: 610 MEADOW VLY DR.
MT. SHASTA CA. 96067
Phone: 916-926-3310

Comments: TO ALL PARTIES WHO ADVOCATE THE FOURMILE HILL GEOTHERMAL DEVELOPMENT

FC.1 AS A RESIDENT OF SOUTH SISKIYOU COUNTY FOR THE PAST 17 YEARS I WOULD LIKE TO STATE MY DISAPPROVAL OF THE PROPOSED FOURMILE HILL GEOTHERMAL PROJECT. // WITH THE ADVENT OF ELECTRICAL POWER DEREGULATION I QUESTION THE

FC.2 NEED FOR ADDITIONAL POWER WHEN MANY REGIONAL POWER COMPANIES HAVE EXCESS CAPACITY NOW.

FC.3 HAVING ENJOYED MANY DAYS HUNTING AND FISHING IN THE AREA I LEARNED THAT MEDICINE LAKE AND THE SURROUNDING AREA IS A CROWN JEWEL. WITH SO FEW OF THESE PRECIOUS RECREATION AREAS LEFT IT IS INCUMBANT UPON US TO PRESERVE THEM FOR THE NEXT GENERATION. ONCE THESE BEAUTIFUL AREAS ARE COMPROMISED THEY ARE DIFFICULT TO BRING BACK. MEDICINE LAKE IS ONE OF A FEW NATURAL HIGH MOUNTAIN LAKES IN CALIFORNIA THAT THE GENERAL PUBLIC HAS ACCESS TO. ALL PARTIES SHOULD CONSIDER THE GENERATIONS THAT FOLLOW US WHEN MAKING THEIR DECISION.

SINCERELY,
John W. Mikec

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter FD

September 24, 1997

Mr. Randall Sharp, USFS/BLM
800 W. 12th Street
Alturas, CA 96101

Re: Fourmile Hill Geothermal Project EIS/EIR

Most of the opponents of this project have expressed adequately the issues of concern. I wish to point out three particular concerns which have convinced me to oppose this project.

From 1978 to the late '80s I flew in my light airplane on a regular basis between Sacramento and Gualala on the Mendocino Coast. The path brings one over the Geyers geothermal facility in Lake County. My flight level was between 5,500 ft. and 7,500 ft. altitude. FD.1

Consistently, I detected the sulfur smell common in and around geothermal plants. I am not aware of any considerations in the draft EIR for the Fourmile project of any negative impacts this common sulfur odor might have in surrounding areas. Another factor is the seismic activity generated by such geothermal power plants. FD.2

Another concern is that this project is a "negative" type project. An analogy would be the prison that was proposed here. Any development of that type should be avoided. We need to increase tourism to bolster our impacted economy. A similar project proposed on the Island of Hawaii some time ago, was abandoned due to the many public concerns. FD.3

What do we have to sell to attract tourists to our area? The mountain, along with the beautiful, pristine country and atmosphere that so impresses visitors. While this may seem of minor concern, it is important to consider since we are talking about tourism, the largest, most desired industry for this area.

Finally, the need for the power locally could be an over-riding consideration. However, when the power generated will be sent elsewhere (coupled with the knowledge that other plants will follow to service other areas), it provides NO benefit locally. Generating power here and then shipping it elsewhere is the same as letting our water be diverted to southern California. Does this make sense? I doubt if this is what the local citizens want to happen. FD.4

Respectfully,

H. K. "Bud" Miller

H. K. "BUD" MILLER
POST OFFICE BOX 460 • 3510 EDDY CREEK ROAD • WEED, CALIFORNIA 96094 • PHONE (916) 938-2704 FAX (916) 938-1401

Letter FE

Ray Miller
P.O. Box 475
Mount Shasta, CA 96067
September 15, 1997

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Sir,

Comment on Fourmile Hill Geothermal Project

After an onsite inspection and a review of available maps it appears the creation of sumps will be a great attractant for wildlife as a water source. There is nothing in the draft EIS/EIR about the expected water temperature or chemical contaminates that may be in the sumps, but there must be a recognized danger because the EIS/EIR specifies terrestrial animals are to be fenced away from the sumps. The issue of protecting birds and bats must be addressed. FE.1

Sincerely,

Ray Miller

Ray Miller

CC: Dr. Elizabeth D. Pierson, Berkeley, CA
Betsy Bolster, California DFG Wildlife management Division
Windy Philpott, USFS R-5 Bat Management Coordinator

Letter FF

8/10/97

Randall:

I believe that the Medicine Lake Area geothermal plants are a bad idea. FF.1
This is pristine wilderness area of which we are quickly running out. The plant would be noisy, dirty, and an eyesore; not to mention that overhead transmission line are a detriment to any scenery. FF.2
I do not believe that the people want this plant(s). Only the businesses, politicians who will gain from them, and the people in Oregon who will get the power want these plants. FF.3
Stand up for the beautiful area that belongs to the people NOT BIG BUSINESS.
Do not allow the power plants to go in and ruin our wilderness. FF.4

Thank you

VKM

Victoria K. Miller
PO Box 37
27032 Walker Rd
Fall River Mills, CA
96028

P.S. It is NOT your land it is the people!!! FF.5

Letter FG

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Gethermal Project
EIS/EIR Corrdinator
800 West 12th. Street
Alturas, California 96101

September 29, 1997

Mr. Sharp:

I am totally opposed to ANY Geothermal Projects on the Klamath and Modoc National Forest Lands! The entire projeet is a rip-off!!! FG.1

I request that this letter of opposition be included in the permant record. FG.2

Thank You,

MISSO NATION
Founded 1974
Reverend DAVID PORTER MISSO
Route #2 Box 142-A
Tulelake, California 96134

Letter FH

Joy Mockbee, MD, MPH
327 Estrella St.
Ventura, CA 93003

September 20, 1997

Randall Sharp
Project Leader
Fourmile Hill/Telephone Flat Projects
U.S. Forest Service
800 West 12 th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing to state my opposition to the Fourmile Hill and Telephone Flat geothermal projects. These are to be situated in a pristine and rare area. We must preserve this beautiful area for future generations, and for benefit of the ecosystem, rather than disrupt it for the profit of a few corporations. FH.1

The BLM and the Forest Service are entrusted to manage and care for public lands, not to enhance their own budgets by making decisions that are detrimental to the public. I urge you to help stop the destructive Fourmile Hill and Telephone Flat geothermal projects. FH.2

Sincerely,

Joy Mockbee, MD, MPH

Sept. 25, 1997

Dear Tandall Sharp
Geothermal Project Leader

I was reading through our local paper here in Mt. Shasta. I came across an article in the opinion section. FI.1

I want to vote no on the development of the Medicine Lake area. I was born and raised in Mt. Shasta. I moved from this area for 5 years to the Sacramento area. I moved back up here to raise my family. FI.2

Once it is developed the beauty of the Medicine Lake area would be gone forever. Northern California is a very special area lets keep it that way.

Thank you for your time

Vicky Moro

1755 Novato Blvd. F-26
Novato, CA 94947

Dear Mr Sharp.

I am writing to you to oppose the CalEnergy and CalPine geothermal projects slated to be constructed in the Medicine Lake Highlands. FJ.1

Although I am sure that these energy companies claim that their impact on the land will be minimal, any intrusion of this nature will be devastating for both the wildlife and the sheer scenic beauty of this yet unspoiled land. FJ.2

Native Americans, in this area as in other areas throughout this country, have felt that the land and its creatures, particularly in such a vibrantly alive place as this, are sacred. We should be stewards of this land and all its creatures not the destroyers. FJ.3

Constructing an 18-acre power plant in this pristine setting would be yet another assault on lands that have been brutally altered, permanently scarred. FJ.4

In our quest for "inexpensive" sources of energy we are stripping our planet of all its natural beauty. The very short term gains of such a project can in no way compare to the long-term (or permanent loss) of wildlife, natural beauty and use of the land as ceremonial sites of many area FJ.5

-2-

tribes.

People throughout this country need to repeatedly stop and ask themselves where this wreckless, escalating consumption of energy (at any cost to our land and all its creatures) leads us. Certainly not to a greater satisfaction with life - only a faster, more polluted, more harried existence amidst more pavement, more cars more toxins in and on the earth, and a landscape that is increasingly less natural.

We should ask ourselves which is more important in the greater scheme of things — to protect our remaining wild, wonderful and sacred lands as places to be quietly, gently enjoyed now and for future generations or for a very few people to get a "break" on their utility bills for a few years at best.

Sincerely yours,
Carolyn J. Mosher

FJ.6

Charles F. Moss
2204 Pine Grove Drive
Mount Shasta, Calif. 96067

September 28,1997

Mr. Randall Sharp
800 west 12th Street
Alturas, Calif.96101

Subject: Proposed Fourmile Hill Geothermal Project, Draft EIR/EIS

The following are exerts from the CALPINE FOURMILE GEOTHERMAL DEVELOPMENT PROJECT EIR DRAFT July 1997. My comments will be addressing only the subjects that I consider to be related to **Hazardous materials or situations** and will be in parenthesis. FK.1

This project proposes to build a transmission line with the capacity to handle 6 plants of this size. I therefore feel that this EIR/EIS is remiss in not once covering the accumulative effect of more than one plant.

4.3 HYDROLOGY Starting on page 4-20.[When reading this section, they proceed to tell you of all the possibilities that could go wrong. They then tell you not to worry, there are laws that prohibit them from happening. Many of these same laws were in existence when accidents occurred at other geothermal plants, but it didn't prevent them from happening.] FK.2

One of the SIGNIFICANCE CRITERIA listed on page 4-21 is the * Changes to the amount of water to any surface body. // On page 4-27 under Operations " During the operation phase of the proposed project, approximately 2.9 million pounds per hour of geothermal fluids would be produced from production wells and approximately 2.4 million pounds per hour would be injected back into the geothermal reservoir. Thus there will be a net loss of approximately 475,000 pounds per hour [approximately 5700 gallons/hour] from the geothermal reservoir." [Now where do you think all of this fluid is going ? If we multiply this by 24 hours of operation, it becomes 11,400,000 pounds per day or 1,367,000 gallons per day of fluid into the atmosphere or someplace else. If we consider the potential of six plants, this brings the total to 68,400,000 pounds of fluids [or 8 million gallons] per day. This is the weight of fluids that contained all of the stink and hazardous materials. This CONDITION is listed under Section 4.19 on page 4-332 as being one of the UNAVOIDABLE ADVERSE EFFECTS and is expected to carry PM/10 and H/2S. They may develop their own stinking rain forest. Medicine Lake area is subject to inversions and is now subject to ground fog in the mornings. With this amount of moisture added to the atmosphere, there may become a permanent fog bank in FK.3 FK.4

the entire Medicine Lake Caldera. I feel that the EIR/EIS is very biased in not pointing out this potential hazard.]

4.3.7 EFFECTS OF AIR EMISSION ON WATER QUALITY page 4-34 "Operations" page 4-35 and 36, table 4.3-3 [This table represents an " extremely conservative model" of the contaminations that can be expected in Medicine Lake after 45 years and is said to have **No Significant Effect** . As an example, the amount of arsenic to be expected is .012 milligrams per liter. The EPA established Maximum Contaminant Level is .05 mg/1. If we consider the accumulative effect of a potential 6 projects, the expected arsenic concentration would be .072 and would be approximately 40% above the EPA allowable. What assurances do we have that any mitigation measures will be taken before any irreversible damage has occurred. This problem is also listed under SECTION 4.19 UNAVOIDABLE ADVERSE EFFECTS. This EIR/EIS is remiss in not addressing the accumulative effect of the likely construction of more that one plant. FK.5

SECTION 4.3.9 page 4.39 EFFECTS OF CHEMICAL AND HAZARDOUS MATERIALS SPILLS ON WATER QUALITY. The proposed project would involve the use of several chemical and hazardous materials. Accidental spills of these materials would not be expected to result in adverse impacts to water quality in the project vicinity, due to planed control practices. [What they are telling us is that they are not planning any accidental spills. That is why they call them accidents. Due to the extreme winter weather conditions in this area, one can expect to have accidents with trucks carrying hazardous materials. I am sure that all of the recorded spills of hazardous materials at the other existing plants were not planed either.] FK.6

SECTION 4.14.1 EFFECTS ON FORREST NOISE LEVELS Says that the County noise compatibility standard my be reached if a person comes within 2,100 feet of construction sites and within 3,200 ft of wellfields and plant operation sites."Additionally, noise levels during operation would not endanger the hearing of forest visitors in these areas, nor would they occur during noise sensitive periods such as night." [I was not aware that this was a day time power plant. Mr. Sharp indicated at the meetings, that the drilling operations would continue 24 hours per day all summer.] FK.7

SECTION 4.15.3 WELL BLOWOUT HAZARDS page 4-282 During the construction and operation of well drilling, well blowouts could potentially occur with resulting uncontrolled discharge of well fluids and / or gases that could affect human health and safety. Page 4.283 Fluids could percolate into the subsurface, but because of the depth of the **shallow** ground water, it would be absorbed by soils and bedrock before it could mix with ground water. [The ground water depth of most of the wells near Medicine Lake are approximately 100 feet. This dose not sound safe to me. The EIR/EIS states that this is not likely to occur because they have plans to avoid this and they will use experienced well drillers. Does this mean that all of the recorded blowouts at other plant didn't have plans or experienced well drillers? To reach the conclusion that this project will have no significant impact to the ground water FK.8

resources is absurd. The author of this EIR is quite clear that a study of the ground water is lacking. On page 3-21 he uses words like "**appears to**", "**data suggests**", "**probably**" **and** "**it is assumed**". This is very misleading to the reader. Somehow I loose confidence in this type of reporting.

This EIS/EIR is incomplete in that it does not address how the environmental damage, once done, will ever be corrected. The EIR/EIS states that Calpine will post a bond of $100,000 for cleanup . This is equivalent to $185 per month for rent and damage. When this plant is finally abandoned, the bond will not even pay for cleanup, much less restore the environment. The U.S.F.S. will be looking to the tax payor to pay the balance, I believe that for the U.S.F.S. to accept such a small amount of bond is criminal and negligent. The bond should be sufficient to pay for the work required at that time of decommissioning. FK.9

I urge the Forest Service to choose the NO ACTION ALTERNATIVE because once this pristine area is lost and damaged, it will never be able to recover, EVEN WITH TAX PAYER MONEY. FK.10

Charles F. Moss

Charles F. Moss RCE 13,141

cc Siskiyou County Board of Supervisors
Assembly Member Tom Woods
Senator Maurice Johannessen
Representative Wally Herger
Diane Bramlett U.S.F.S.
Lynn Sprague U.S.F.S.
Barbara Holder
Dan Glickman. Sec Dept. of Agriculture
Ed Marrihew Calpine Corporation

Letter FL

Aug. 22,1997

Doris H. Moss
2204 Pine Grove Drive
Mount Shasta, Ca. 96067

Mr. Randall Sharp
USFS/BLM
Telephone Flat Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, Ca. 96101

Dear Mr Sharp,

The following comments are meant to apply, not only to the proposed Telephone Flat project, but to each and every proposed Geothermal Development in the vicinity of Medicine Lake.

As a property owner at Medicine Lake, I am extremely concerned with the effect that the proposed geothermal plants will have on the property values in the Medicine Lake Highlands. I am sure that you can understand, that should there be a noxious odor, or a offensive noise emitted, it would greatly effect the desirability of this pristine property. FL.1

As a Real Estate Broker for over 25 years, I can assure you that there would be little interest in moving to this area if any of these thing occur. I have attended two of the public hearings on the Telephone Flat Project, and none of the officials representing the projects, have been able to state that there would not be a noticeable sulphur odor nor an objectionable sound emitted. As a matter of fact, I found them to be very vague and deceptive in their response to these questions.

Respectfully,

Doris H. Moss

Doris H.Moss

C.C. Carol Plank, President, Medicine Lake Home Owners Assoc.

Letter FM

September 21, 1997

Tandall Sharp, Geothermal Project Leader
USFS/BLM,
800 W. 12th St. Alturas, CA 96101

Dear Ms. Sharp,

Please do not allow a Geothermal plant to be built at Medicine Lake, Siskiyou County, California. FM.1

Medicine Lake is a precious resource. It is more beautiful than Lake Tahoe, CA. The project will change the Medicine Lake area forever. The Lake and its aquifer will become polluted with geothermal wastes such as hydrogen sulfide and other heavy metals. FM.2

The wildlife will start disappearing. FM.3 The power plants will generate wastes as hazardous materials come and go from the power plants. FM.4

The rotten egg smell of the geothermal generation will not go with the smell of pine trees. FM.5

Please help stop this now. FM.6

Sincerely yours,

Ana Mulvaney

Ana Mulvaney
4413 Holly Ave,
Dunsmuir, CA 96025

cc Senator Barbara Boxer
Lynn Spraque, Regional Forester
President Clinton

Letter FN

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

Ve value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 : the address listed at the bottom of the page.

'our Name: Burt + Pamela Myers
ıddress: Po 700
Mount Shasta, CA 96067
'hone: (916) 926-1413

:omments: We are totally against the development in Medicine Lake Highlands with regard to geothermal development. — FN.1

This is a treasured & pristine area. Do not allow this desecration — Protect the precious wildlife — the land — the people. We are distraught by the filthy greed, greed, greed! SHAME! SHAME! SHAME! FN.2

ʃ you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter FO

Eric T. Nelson
7020 SE Hwy 101
Lincoln City, OR 97367
(541) 994-5732

August 3, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I have just received notice regarding the proposal for the geothermal power plant proposed for the Four Mile Hill Area near Medicine Lake. I strongly support the No Action Alternative in the EIR, based on the adverse and significant adverse effects listed in the EIR regarding visual resources, air quality, noise, water quality, vegetation and wildlife resources. FO.1

I was born and raised in Northern California and have been vacationing at Medicine Lake for the past twenty years. This is an area of high recreational value, and has been promoted (and developed) as such by both the Forest Service and local communities. This area is also unique because of its volcanic geology, cultural resource values, and abundant wildlife. As I'm sure the EIR indicates, the proposed project area around Medicine Lake is habitat for nesting Bald Eagles, Osprey, and Cooper's hawks (probably Spotted Owls and Goshawks also), as well as mountain lion, black bear, marten, mule deer and a host of other species. In short, an area of significant biodiversity that has sustained itself despite increasing recreational use and consistent timber harvest. Unlike the latter two uses however, which are short-term and seasonal in nature, the proposed development is neither short-term nor seasonal. This proposal is NOT compatible with the existing values of the area. I grew up near the geysers project in Lake County, California and have seen first hand how the significant FO.2

adverse effects of a geothermal development can wreak havoc with part of an ecosystem.

I have been a Wildlife Biologist with the US Fish and Wildlife Service for the past 15 years and worked as a seasonal biological technician for both the USFS (Big Valley Ranger District, Modoc County) and the BLM. I am familiar with the concept of multiple use and am aware of the difficulties involved in managing public lands, as I do so on a daily basis.

Although I have not yet had a chance to review the full EIR/EIS, (I will do so as soon as possible and send a more detailed response then), my comments today are based primarily on two newspaper articles from Mt. Shasta written by David Manley. FO.3

If these articles are accurate, it appears that the BLM/USFS (and associated responsible officials) are not concerned about the potential real adverse effects of the proposed projects as identified in the EIR/EIS. It appears to be a case of public officials sacrificing a significant amount of PUBLIC resources to appease local politicians (Siskiyou County Board of Supervisors) and a couple of PRIVATE geothermal development companies seeking to enrich themselves and their stockholders at the expense of the public, a true tragedy of the commons in the making. It also concerns me greatly that the community of Mt. Shasta has been omitted as a public comment site after an earlier hearing there apparently raised significant concerns and objections to the proposal.

As you know, the NEPA/CEQA process is supposed to be an objective process using the EIR/EIS as a way to objectively document the cumulative environmental and economic costs of a project and then coming to an objective decision. It is not intended to be a rubber stamp either for or against. Omitting the location (and thereby many of the people) who raised concerns about the proposal is certainly not the intent of the law. FO.4

Personally, I do not believe that it is the legal mandate of public agencies to promote projects of private gain on public lands when the costs are permanent and significant and the benefits are minor. This certainly appears to be the case here. There is NO way that the relatively meager amount of energy produced over the life of these proposed projects (at such a significant distance from any metropolitan area), even begins to counter the adverse biological, cultural, and recreational costs of these projects. Our public (and private) lands are already littered with these types of boondoggles; let us learn from previous lessons and not make the same mistakes over again. FO.5

Unfortunately, I will not be able to attend the public hearings scheduled for August 5-7, but wish to go on record as adamantly opposing any geothermal development in the Medicine Lake Basin on behalf of myself and my family. FO.6

Sincerely,

Eric Nelson

Eric Nelson

cc: Vice President Al Gore
Senator Diane Feinstein, California
Senator Barbara Boxer, California
Mr. Bruce Babbitt, Secretary of the Interior

P.S. Please add me to the mailing list for this project & any other geothermal proposals or exploration work to be done in Modoc or Siskiyou Nat'l Forests. FO.7

Letter FP

Eric T. Nelson
Martha Spencer
7020 SE Hwy 101
Lincoln City, OR 97367
(541) 994-5732

September 27, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

RE: Fourmile Hill Geothermal Project; comments to Draft EIS/EIR

We have recently reviewed the EIS/EIR for the geothermal power plant proposed for the Four Mile Hill Area near Medicine Lake. We strongly support the No Action Alternative, based on the adverse and significant adverse effects documented either in the EIS/EIR or this letter regarding socioeconomic, cumulative impacts, endangered and threatened species, wildlife habitat, water quality and quantity, visual resources, air quality and noise. **FP.1**

Issues regarding the proposed project and the Draft EIS/EIR are listed below. A written response in the Final EIS/EIR to these comments is requested. A more detailed explanation on the need for this project and bond requirements along with additional public scoping is also requested. **FP.2**

Purpose and Need

Section 1.2 states that the purpose of this project is to "develop the geothermal resource on Calpine's Federal geothermal leases CA21924 and CA21926 to economically produce and deliver electrical energy to BPA and others". Paragraph 4 also states that regional growth and increasing constraints on the existing energy resource base requires BPA to pursue this project.

During the public hearing on August 30 at Medicine Lake, Calpine representatives stated that power produced would cost the consumer over two times the rate for electrical power currently marketed by BPA. Who would bare the brunt of this additional cost? Is this considered economical under the Energy Policy Act of 1992? What are the regional constraints on existing energy resources to require this project? Please address these issues and document the "regional growth" that requires additional energy supplies in the Final EIS/EIR. **FP.3**

Page 1-14 states that Calpine received approval for exploration test drills of this site but to date has not initiated the proposed exploration. Page 2-79 states that if the production capacity of the plant is reduced below the requested 49.9 MW(net) and Calpine could not charge a higher rate per unit, Calpine would consider the project to be infeasible from an economic standpoint and the project would not be built. If approval for the test drills have been secured, why is Calpine pursuing a project that cannot guarantee an adequate power supply? Why have the lead agencies spent so much time, effort, and taxpayers dollars on a project that will certainly have significant adverse effects on: Native American rights and cultural resources, endangered species, wildlife habitat, and the overall quality of the Medicine Lake Highlands when the project may not be economically feasible? Why haven't the lead agencies required the test drilling prior to project approval? What is the rush to develop this project before baseline data has been collected? Please address the accelerated timeline in the EIS/EIR with regards to project development. **FP.4** **FP.5**

This project has also been labeled a "green project" because it utilizes an alternative energy source. Section 1.2 also state that BPA completed a Resource Program EIS that recommended the inclusion of power supplies from "renewable" resources. This project has a proposed life of 45 years. During this time much environmental damage will occur in a pristine area. Does this project then qualify as a "green" project? If so, the agencies need to reevaluate their definition of green. Also, under the Northwest Power Act, as referenced in Section 1.2, what is the definition of a renewable resource? Does a project of 45 years fit with this description? Please address these issues in the Final EIS/EIR. **FP.6**

Finally, the Energy Policy Act of 1992 directs the Federal government to "foster and encourage private enterprise in the development of alternative energy resources, within appropriate environmental constraints."(Sec. 1.2, Paragraph one). What is the current definition of appropriate environmental constraints? The Draft EIS/EIR details many adverse significant impacts of this project; where is the point of no return? And who decides? Please address these issues in the Final EIS/EIR. **FP.7**

Bond Requirement

The Draft EIS/EIR states that Calpine is required to post a $100,000 bond to pay for mitigation of any environmental damage and cleanup. How was this amount decided? We seriously doubt this amount could be anywhere near adequate to cover cleanup costs of sumps, deal with any accidents or spills, or to disassemble the plant and transmission lines. Please include a discussion (including estimated costs to clean up specific portions of the project) in the Final EIS on the responsibilities of Calpine and the USFS on the decommissioning of the plant. Please include a cost breakdown of decommissioning a project of this magnitude and an economic justification for requiring only a $100,000 bond. This seems an inadequate figure right now, let alone 30-45 years from now. **FP.8**

It is our understanding that a similar project was constructed outside of Alturas on public land at Hayden Hill. This project was not economically feasible and has now been abandoned but not decommissioned. To what extent has this project been cleaned up and how much did it cost ? If it has not yet been cleaned up, what are the estimated costs to do so ? Who is paying for this? Was a bond required, and if so, how much was ir for ? Did it adequately cover the costs of the **FP.9**

project cleanup? Please address these issues and questions in the Final EIS/EIR, as they are pertinent to this project.

Scoping

The majority of the people affected by this proposed project will be the recreational users of the Medicine Lake area, included but not limited to the campers, cabin owners, fishermen, hunters, mushroom hunters, birders, boaters, snowmobilers ect.... According to the Draft EIS/EIR over 40,000 people use the Medicine Lake area annually for recreation. After reviewing the environmental document, there was little recognition of these user groups in the scoping process.

While visiting the Medicine Lake campgrounds twice this summer, there were no notices posted either at the campgrounds or the boat dock, even to notice users of the public hearing on the project at Medicine Lake onAugust 30, 1997. There was no attempt to notice any of the game hunters or mushroom hunters, both who must register with state and federal offices in order to gain permission for use of these resources in the area. This is a whole group of users who's voice on the project should be heard! FP.10

Please consider this a second formal request to extend the comment period, to August 30, 1997, to allow for the above mentioned users of Medicine Lake the ability to comment. If this will not be done, please comment in the Final EIS/EIR as to attempts to rectify this or justification for the omission.

Environmental Issues

Water Quality and Quantity

Section 3-15 of the EIS/EIR cites water studies done at Medicine Lake in 1971, 1982, 1983, and 1992. These studies did not include an analysis of water chemistries including metals and organic compounds. The proposed project would produce air emissions that would eventually end up in Medicine Lake water systems. The table in the Draft EIS/EIR states that Arsenic, Beryllium, Cobalt and Sulfate are approaching the MCL/SNARL levels. If a baseline study for metals and organic compounds has not been completed, how can the effect of air emissions on the hydrology of the area be determined? Please provide more information about water chemistry of Medicine Lake prior to project decision. FP.11

Section 2 of the Draft EIS/EIR states that 10,000 gpd of water would be needed for dust suppression, 90,000 gpd of water would be needed for the cooling tower, 20,000 gpd of water would be needed for well drilling (a 30 - 45 day process) and over 1,000,000 gallons of water would be needed in the cooling tower to start the process (over 6.9 million gallons of water per year during construction). Approximately 8.5 million gallons would be required during the peak of construction in the third year. This is an incredible amount of water! The majority of water will be taken from the well drilled at Arnica Sink; however, some water is proposed to be "trucked in". FP.12

Table S-5 states that the project will have a "less than significant effect" on water quantity ("effects of water use"). This just seems hard to believe that removing this much water per day will not have any effect on an area in the Semi Arid west! California recently recovered from a five year drought. The Medicine Lake water table was greatly affected by this drought along with many domestic water systems going completely dry. Will there be any safeguards for water users (cabin owners and recreation) if another drought occurs? Please include a discussion in the Final EIS/EIR for water usage during a drought period and any proposed mitigation for water users of the area. Also, please provide further information to section 2-31 regarding the source of the water that will be "trucked in".

Wildlife

The document lists 12 federal and 19 state special status species. Many of these are species which generally survive best in wilderness and/or remote areas. This proposal and associated developments (see cumulative impacts section) would undoubtedly drive many of these species out of the area. Please address the following potential project effects on wildlife.

- Effects of nightlight pollution and noise pollution on nesting Bald Eagles and Osprey,

- Effects of heavy metal pollution (from air or water pollution sources) on the fish (and associated predators like eagles and osprey) of Medicine Lake, FP.13

- Effects of proposed powerline route (A1) adjacent to use areas (Medicine Lake) of above 2 species, please contrast this with other alternatives,

- Effect of water withdrawals of all potential projects combined on the Shasta Crayfish and other listed species in the Fall River drainage. Please discuss the status of the USGS study on groundwater relationship between the Medicine Lake area and Fall River and clarify the lead agencies position on this issue.

- Effects on all listed species on the cumulative effects of this proposal and Telephone Flat (and any other proposals in the KGRA the lead agencies may be aware of)

Visual Impacts

The Medicine Lake Highlands is a remote area with relatively few man-made changes to the natural scenery. The majority of the users of the area come here because of this reason. There are no telephone lines or TV antennas to block the views. The Draft EIS/EIR is correct when it states in Section 3-124 that "there is a strong sense of place and remoteness to the lake... With the exceptions to of a few private cabins and the public boat launch that visually encroach on the lake and the shoreline, there is an overall sense of intactness to the lake's character". FP.14

Section 2-28 details the construction of a cooling tower that will be 70 feet high and 355 feet long (greater than the length of a football field!). This structure will be lit up at night. Drilling rigs over 145 feet high in operation 24 hours per day will also be lit at night. Please be aware that there currently are no lighting structures within the Medicine Lake caldera. These lights will be visible for miles around. We do not agree that this lighting will have no effect on the KOP's of the Medicine Lake area. Please re-evaluate this section on lighting and visual quality.

Section 4-138 outlines the potential effects of steam plumes on the Medicine Lake area. These steam plumes will be present year-round and extend 250 feet above the 70 foot cooling tower. In addition, well venting will reach 285 feet for a six week period. The steam plumes will significantly effect the visual quality of the area. Please include justification as to the no impact designation for steam plumes on the VQO from the Medicine Lake KOP. FP.15

Noise

Section 4.14 of the Draft EIS/EIR finds that the noise of construction would provide a significant unavoidable impact. Again, one of the reasons that people come to the Medicine Lake Highlands is due to the relatively unaffected natural quality of the area. Often, you can hear conversations going on-on the other side of the lake (over a mile away!). The recommended solution to recreational users bothered by the power plant is to move out of the vicinity of the area. This is truly an unacceptable "mitigation measure" for the project. Please provide additional mitigation proposals to deal with this issue. FP.16

Socioeconomic

The Draft EIS/EIR states that there will be no significant affect to property values in the Medicine Lake area (Page 4-301). The reasoning given is that there supposedly will be no significant effects to noise or visual quality in the area, property values in the Medicine Lake area should remain the same. This statement is contradicted by the evidence presented in sections on the proposed powerline and power plant throughout the document ! Our question is- Do most people want to own cabins and recreate in an area of two and possibly six power plants? The reason that people come to Medicine Lake is to get away from man-made craziness and relax in a more natural and pristine location. The addition of one (and possibly six) power plants (and associated development and use) will definitely effect the natural resources of the area and the reason to recreate here. Please re-evaluate the "no impact" designation to property values as a result of the proposed power plant and include a written justification in the Final EIS/EIR. FP.17

The proposed project will also include winter maintenance of roads not traditionally kept open. As outlined on page 2-21, increased traffic and use of these roads will occur in the winter. The majority of cabins at Medicine Lake are used only in the summer months, and are left unsecured in the winter because there is no access due to the high volume of snow. The project will open roads currently unavailable for use. Please address in the Final EIS/EIR how the project proponents will ensure the security of the Medicine Lake cabins due to the increased access and vehicular traffic during winter months. FP.18

Air Quality--SCAPCD

The Medicine Lake Highlands currently experiences exceptional air quality. There are no industrial users in the area, limited vehicular traffic and minor smoke exhaust from the two local campgrounds. We are concerned about the effect of emissions from the plant on the air quality and the possible number of plant upset conditions. FP.19

We are also concerned that the regulatory agency, the Siskiyou County Air Pollution Control District (SCAPCD) may not be able to adequately monitor the proposed project. Currently, the County does not have staff available that is knowledgeable in geothermal power plants. Is there a mitigation measure requiring that they hire staff with the abilities to adequately monitor this plant? How often will they be on site (please remember that Yreka, the county seat is a two hour drive to the site)? If Calpine is found to be in chronic non-compliance with air quality standards, what is the response of the regulatory agencies (SCAPCD, BLM, and USFS)? Please provide written responses in the Final EIS/EIR. FP.20

Cumulative Impacts

The Draft EIS/EIR for Fourmile Hill takes over 800 pages to discuss the potential effects of this project. Of this 800+ pages approximately four paragraphs are dedicated to the potential cumulative effects (pages 4-312 and 4-314) of another project proposal (CalEnergy's Telephone Flat) of equal size ! Doesn't this seem a little out of balance ? FP.21

This document, as stated on page 1-4, "is intended to fulfill both the format and content requirements, as well as the spirit, of the two statutes (NEPA and CEQA)." If this is truly the case, the lead agencies need to do their job and go back to the planning table and address all proposed geothermal development in the KGRA as one whole project, not piecemeal in one project at a time for the next 5-10 years, as appears to be the strategy. At the very least, please address why the proposed transmission line is for 300 MW, and do a more thorough job of addressing the cumulative impacts of the proposed Telephone Flat project. Please tell us if we should multiply the significant adverse effects of this project by 2 or 6 to come closest to what will ultimately occur in the project(s) area. If these effects and impacts are multiplied by the true number of powerplants that will ultimately be built (2-6 ?), THEN do they become significant to the lead agencies, or is this still a green project ? Please address this question. FP.22

In a discussion with Calpine's environmental representative (Ed Merrihew) at Medicine Lake on September 3, he stated that Calpine has not even done enough test drilling to know what "size resource" they may hit at Fourmile Hill, he said, "it could be nothing , it could be 50 MW, it could be 150 MW". So, if it's a "dry hole" the lead agencies have just wasted alot of tax dollars going through this public review process, and if it is a 150 MW "hole", will that change the size of the powerplant ? Please address these issues. FP.23

The geothermal resource in the KGRA is not going anywhere in the near future. It would behoove the public to do a more thorough job in analyzing the true size and effects of all FP.24

proposed development associated with the KGRA, that is what the "spirit of NEPA and CEQA" refers to, is it not ?

Conclusion

We have been coming to Medicine Lake every summer for thirty five years and 20 years respectively. During this time we have come to treasure the pristine environment that this area offers; no electricity, no television and no crowds! I can't express in words the thrill it is to see an eagle sweep down from a tree and catch a fish or a mountain lion saunter across a road or a pine martin play in your "front yard"! All these things we have witnessed and enjoyed at Medicine Lake. **FP.25**

The current proposed project will significantly impact on the quality of the recreation at Medicine Lake which is the use the land should be protected for. The Forest Service has spent significant amounts of public money developing recreation in the Medicine Lake area over the past 20 years (including a boat dock launching area, access roads and campgrounds, and a snowmobile staging area with a large warming hut which cost over $100,000!) . Recreation should be the focus of this area, not energy development.

While we agree that public lands should be put to multiple uses where appropriate and that we need to pursue clean sources of power wherever environmentally and economically feasible, this proposed project in the pristine Medicine Lake area given the documented adverse impacts and lack of economic benefit, simply MAKES NO SENSE! ***In short, the No Action Alternative is the only reasonable recommendation at this time.*** **FP.26**

Sincerely,

Eric Nelson

Martha Spencer

cc: Kathy Fisher, Bonneville Power Authority
Rich Burns, Bureau of Land Management
Diane Henderson-Bramlette, US Forest Service
Barbara Holder, US Forest Service
Lynn Sprague, US Forest Service
Siskiyou County Board of Supervisors
Senator Diane Feinstein, California
Senator Barbara Boxer, California
Mr. Bruce Babbitt, Secretary of the Interior
Dan Glickman, Secretary of the Department of Agriculture

Sept 29, 1997

Letter FQ

Please Please don't sell out to Cal Energy and Cal Pine. The destruction of the old-growth reserve would be blasphemous and desecrate the Creation. Let Oregon generate its own power. We need Awesome Nature more than those greedy companies need money. We do not want an 18-acre power plant, acres of well sites, 20 miles of 120 ft electrical towers and more roads !!! **FQ.1**

Isn't California good for anything besides exploitation by Euro-americans?

Please oppose Cal Energy and Cal Pine and preserve the Medicine Lake Highlands in the Modoc National Forest and the sacredness of Native tribal homelands. **FQ.2**

Joy Louise Newcom R.N. F.N.P.P.A

Registered Nurse Family Nurse Practitioner Physician's Assistant
Northstate Women's Health Network
Churchwomen United

Letter FR

8-11-97

To Whom it May Concern,

I am writing this letter in opposition to the proposed Southernest plants in Medicine Lake. I was born and raised there in Mt Shasta. My family went camping every Summer in the Medicine Lake region. Mt. Shasta is my home + I plan on coming back there when I get done with college. I do not want to take my children to an area that was once beutiful + clean + is now ruined due to your plants. FR.1

FR.2

The people in Siskiyou County will not benefit from this plant nor will the enviroment. If the people in Oregon need power, put the plants up there Not here. FR.3

Respectfully yours,

Julie Norman

210 E Hinkley #1
Mt Shasta Ca
96067

Letter FS

1982 Waldron Dr.
Anchorage, AK 99507
September 29, 1997

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Mr. Sharp;

I would like to comment on the CalEnergy and CalPine proposals to build a geothermal power plant in the Medicine Lake Highlands. This plant, which will involve the installation of quite a few well sites, 20 miles of electrical towers and many new roads, may be acceptable in a grasslands or desert area. But the Medicine Lake Highlands has remarkable old-growth forests, endangered species (including the spotted owl), two roadless areas and other outstanding natural and cultural attributes. FS.1

For all these reasons, I urge you to oppose both of these projects. Thank you.

Sincerely,

Frank Norris

Frank Norris

Letter FT

1536 Eldorado
Klamath Falls, Ore. 97601
Sept. 27, 1997

Randall Sharp, Project Coordinator
U.S.F.S./B.L.M.
800 W. 12th St.
Alturas, Calif.

Dear Mr. Sharp
In regards to the proposed Geothermal power plants near Medicine Lake, I would like to go on record as in favor of this project. FT.1

I am presently and have been the owner of a home at Medicine Lake. I am also a member of the Medicine Lake Homeowners Association.

There are some self-proclaimed "leaders" of the Homeowners Association, that are adamantly opposed to this project, and are fighting it with ever y bit of propaganda that they can, including some false statements.

I feel that they are very short-sighted, as they are all dependent on electricity along with millions of other people. I believe that in a few years hence the demand for electricity will be greater than the supply, and this new resource of energy will be needed to help fill the void. FT.2

I have attended a couple of local informational meetings, as well as the seminars at OIT in Klamath Falls, plus the field trip to Medicine Lake. With all of the data presented and the questions answered I cannot see any objectional impact to the environment at Medicine Lake.

Now is the time to approve this power plant project, and take advantage of t his wonderful natural resource which will be financially beneficial to the F.S. and the economy of the region. FT.3

It is my hope that this project gets on line before other sources of electricity get shut down.

Sincerely,

Claude Olson

Claude Olson

Letter FU

OLGA E. ORR
7470 Seneca Place
La Mesa, CA 91941
Telephone: 619/466-1702

September 26, 1997

Randall Sharp
Project Coordinator
USFS/BLM
800 W. 12th Street
Alturas, CA 96101

Dear Mr Sharp:

I am absolutely appalled at what is being planned by the U.S. Government in the Medicine Lake area.

We discovered Medicine Lake more than fifty years ago. We would throw our sleeping bags on the sand and spend several nights and days there. We were, then as now, overwhelmed by the pristine beauty of this area. This was before there were any cabins, etc. at the Lake. The quiet serenity of the Lake and the surrounding area made this an ideal place for summer camping. And in winter we would trek in by skis and snowmobile, across the frozen Lake, to enjoy the hush of the snowy forest. FU.1

Now I am in my nineties and still enjoy the Lake. Over the years, we have shared experiences there with our children and grandchildren and their friends. I am sure you are aware of the fact that when the bright lights go on and all the generators rumble on all day and night, it will not only drive away outdoor-loving people (and ruin the value of our property). They will also drive away the songbirds and other wildlife in the area. FU.2

It seems to me that your right hand does not know what the left hand is doing. As long as I can remember, the government has been advocating: ***Save the environment!***. Now you are planning to go full blast in destroying it. FU.3

Is there any need of thermal power from this particular place? I understand the State of Oregon doesn't need it; in fact, doesn't want it. So why the big push for destroying a beautiful natural area, loved and prized by visitors and local people? FU.4

Please, please: whatever you do, cancel these big plans for creating thermal power that will destroy the natural environment of this very special place. FU.5

Sincerely,

Olga E. Orr

Olga E. Orr

Letter FV

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

/e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 ı the address listed at the bottom of the page.

our Name: Anna Lee Padula
.ddress: 672 So 1st.
Dunsmuir CA
hone: 916-235-4855

:omments: Please keep this beautiful natural lake and all surroundings unspoiled from all man (Developments)
Some areas are and should be as is for the people & these person's children to have these areas natural & only available for sight seers & campers-

Please leave it be- There are hundred of acres in other areas that are available without so much beautiful history-

Thank you

FV.1

f you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

: value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please
mit any comments at the close of the public hearing or send comments by September 16, 1997
he address listed at the bottom of the page.

ur Name: Doug & Phyllis Parker
dress: 81 North Court Rd.
Ukiah, CA 95482
one: 707 462-3752

mments: Medicine Lake has been a favorite destination for us over many years. We enjoy the lake, the fishing, the mountains, the pine forests and winter sports. We do not want to see the area destroyed with pipe lines running throughout from geothermal plants that are draining waters from the lake and the surrounding caldera. The only waters running into Medicine Lake are from the melting winter snows since no streams run by to replenish its supply. FW.1

The endless water supply needed for geothermal operation could easily diminish the waters in and around the lake and caldera. Just consider the Geysers operation in Lake County here in California that are already non-operative because of no water supply. FW.2

Save Medicine Lake and the surrounding countryside for the present and future enjoyment of everyone. FW.3

Sincerely,

Phyllis D. Parker
Doug Parker

you wish, you can mail your comments to:
Mr. Randall Sharp
SFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
Alturas, California 96101

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please
mit any comments at the close of the public hearing or send comments by September 16, 1997
he address listed at the bottom of the page.

ur Name: Jacquie Parker
dress: 1405 Audubon
Mt Shasta
one: 926 4776

mments: I strongly oppose geothermal developement in the Medicine Lake area. Our need for electricity does not balance the permanent destruction of pristine willerness land that is irreplaceable. FX.1

I have no new arguments to add to those you've heard before:
Wildlife migration
noise & visual pollution
air pollution
destruction of wilderness FX.2

Please add my name to those who oppose this project. FX.3

Jacqueline Parker

ou wish, you can mail your comments to:
. Randall Sharp
FS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
) W. 12th Street
uras, California 96101

Sept 23 1997

Letter FY

To whom it may concern.

we are very opposed to the proposed Fourmile Geothermal project. Because of LSR status we object to wildlife habitat destruction. This area has long been a native american heritage area. No to this project-

FY.1

Dr. & Mrs. S. Perlman
Box 117 Greenview Ca
96037

Letter FZ

P.O. Box 543
Kelseyville, CA
95451

September 15, 1997

Randell Sharp, Project Leader
Modoc National Forest
800 West 12th St.
Alturas, CA 96101
Re: Fourmile Hill/Telephone Hill Project

Dear Sir:

Being concerned about this proposal to construct a geothermal power plant in the Medicine Lake Highlands area, I am very much opposed to this Project. Here in Lake County, California we have a similar geothermal project and resulting change in environmental biodiversity. I am horrified to think of similar devastation to the Medicine Lake area as a result of geothermal power exploitation. I am a frequent visitor to Medicine Lake and along with many other visitors love its biodiversity values which includes freedom from the frantic pace of recreation activities. This precious visitor area deserves national monument status instead

FZ.1

FZ.2

Katherine Patterson
Re: Medicine Lake Geothermal Project

Page 2

of the blight of power plants, wellsites, pipelines for steam, electrical towers, many miles of roads for access, destruction of ancient forest for roads and powerlines — and so forth. These factors I am familiar with here in Lake County. And when the wells run dry (as is happening here) what will happen to this once pristine environment.

FZ.3

High tension power lines as of now run through the Klamath Lake Basin bringing power SOUTH from Oregon - Washington - Columbia River Sources. It seems highly ironic to reverse electrical flow south to north leaving California to Oregon. It is certainly more feasible for Oregon to tap into these power lines originating in their territory rather than destroy our unique Medicine Lake and surrounding environs including infringement of historical religious use for the Klamath, Modoc, Shasta tribes; habitation for both northern and California spotted owls, goshawk, peregrine falcon, etc., and year around water source of Medicine Lake.

FZ.4

Please oppose the CalEnergy and CalPine geothermal project. Instead encourage national monument status to protect its wild character. It's a wonderful place.

Sincerely yours
Katherine Patterson

P.S. Please keep me informed at the above address

FZ.5

Letter GA

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: AUTOINETTE C. PHILLIPS
Address: 2230 DAVIS PLACE RD.
MT. SHASTA, CA 96067
Phone: 916-926-6521

Comments: I am a registered voter. I moved to Mt. Shasta Area because of the unspoiled, beautiful wilderness. I agree with Carole Plankard and the Concerned Citizens that these plants should not be allowed here.

GA.1

This country is being torn apart because no one can stand to leave this earth in its original shape. Where will we have to move next?? To Alaska?

Leave Medicine Lake the way it is. Please.

GA.2

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GB

2556 Hilgard Ave.
Berkeley, CA 94709-1105

Fax (510)-843-5501 Tel (510)-845-5313
Edpierson@aol.com

September 29, 1997

Randall Sharp
U.S. Department of Agriculture
Forest Service, Modoc National Forest
800 West 12th Street
Alturas, CA 96101

RE: Fourmile Hill Geothermal Development Project

Dear Mr. Sharp:

The purpose of this letter is to comment on the assessment of impacts to bat species as outlined in the DEIS/EIR for the Fourmile Hill Geothermal Development Project (State Clearinghouse No. 96062042), and to provide relevant information that has emerged from a recent radiotracking study of Townsend's big-eared bats at Lava Beds National Monument.

Section 3.8. The document implies that suitable habitat for the pallid bat is confined to the "lower elevations from the eastern slopes of the Medicine Lake Highlands down onto the Modoc Plateau " (p. 3-109). Pallid bats occur up to 10,000 feet in the central Sierra Nevadas (D. Graber, Sequoia National Park, pers. comm.), and are one of the species most frequently encountered at 6,500 in giant sequoia/red fir forest (per. obs). While pallid bats are best known from lower elevation forested habitats, I have found them to occur in the 4,000-8,000 foot elevation range, and in that elevation range would make no distinction between their broad habitat associations and those for some of the other species (e.g., *Myotis volans* or *Lasionycteris noctivagans*). **GB.1**

Section 4.8. This document makes the statement that neither construction nor operating noise would adversely affect a number of the bat species (i.e., pallid bats, silver-haired bats and special status *Myotis* species), and bases this conclusion on data collected by W. Rainey and myself in the upper Sacramento River drainage. This misinterprets our data and makes unsupported assumptions.

On p. 4-119, the document states: "Based on recent studies in northern California of bat behavior by D. Pierson and W. Rainey, pallid bats are known to use both diurnal and night roosts in areas exposed to high levels of highway and railroad noise." This statement is not accurate. While we identified one regularly occupied bridge night roost, it was located on a rarely used access road, and was at least 100 m.(and in a location somewhat buffered) from an active railroad line. All diurnal pallid bat roosts located during the course of this project were in trees located at least 1 km. from a highway or railroad. In this study, and in another study I conducted in the Carmel Valley, the relatively light noise generated by investigators locating tree roosts on foot (by radiotracking) was sufficient to cause animals to temporarily abandon these sites. While pallid bat nursery colonies occur in human-occupied structures, I know of no data evaluating the tolerance of this species for specific noise levels, nor for unexpected, unfamiliar noise. **GB.2**

On pp. 4-119 and 4-120 , the document states: "Recent studies of tree-dwelling bats such as *Myotis* sp. and silver-haired bats have been conducted by D. Pierson and W. Rainey in the vicinity of the upper Sacramento River. Based on these studies, tree-dwelling bats are known to use both diurnal and night roosts in areas exposed to high levels of highway and railroad noise." **GB.3**

Again, this statement is not accurate. We located over 20 tree roosts for silver-haired bats. All but one were located more than a km from the highway/railroad corridor. The roost closest to the highway (ca. 200 m) was located in a forested draw and was buffered from highway noise.The available evidence suggests that there are significant differences among *Myotis* species in their response to human disturbance and thus lumping them together is inappropriate. While our studies identified diurnal tree roosts for *Myotis yumanensis* close to the railroad line (closest roost was ca. 50 m), this study was conducted late in the reproductive season. Thus we have no evidence that these roosts were being used when females had dependent young. Additionally, this species, which does not have special status, is generally recognized as tolerant of some classes of human disturbance. In contrast, no diurnal roosts for any of the special-status *Myotis* species were located during the reproductive season within 1 km. of the highway or railroad corridor in our study. Bridge night roosts were used by some of the special-status *Myotis* species, but no active bridges were used as diurnal roosts. While some special status *Myotis* species are known to occur in human-occupied buildings in other settings, I know of no data evaluating their tolerance for specific noise levels, their tolerance for unexpected, unfamiliar noise, nor their ability to adapt to long term changes in local noise levels. I do know from my own experience that human incursion into a *Myotis thysanodes* or *Myotis evotis* roost area can cause the animals to abandon the roost.

The document states on p. 4-112 that: "If noise levels of 70 to 75 dBA were present on a long-term basis without the accompanying activity of humans or machines, wildlife (including bats) would gradually adapt to the noise, and the avoidance response would subside." I know of no data to substantiate this conclusion for bats. Use of dBA as a measure of noise (and disturbance) to bats ignores the fact that frequencies used by bats for prey detection and communication are largely above the range of human hearing. **GB.4**

In summary, this document is misleading in several ways regarding bats. First, it fails to distinguish among roost types. Whereas a number of bat species will night roost in areas with relatively high noise levels (e.g., under active highway bridges), most are far more sensitive to acoustic disturbance at their diurnal roosts, particularly if these are maternity roosts. This document also assumes that because species may have adapted to noise levels in one setting (e.g., roosting in human-occupied structures), they will tolerate construction and operation noise associated with the geothermal project. This overlooks the fact that bats may make distinctions regarding noises they will tolerate, and that factors other than perceived intensity (e.g., predictability) may be important. It also overlooks the fact that the location of the noise source may make a difference (e.g., bats will night roost under -- but apparently never over --- active highway bridges [G. Erickson, Cal Trans]). The document also does not adequately address the spectral distribution of noise -- and the potential for ultrasonic noise, potentially disturbing to the bats, to be generated by the geothermal operation (e.g., venting of high pressure gas or vapor). **GB.5**

The document states (p. 4-112) that during the construction phase wildlife (including bats) would be expected to avoid construction sites, and that these animals would be displaced during the summer and fall for a three-year period. It then concludes that because this displacement is temporary the effects "are not expected to be significant." This overlooks the fact that bats have an extremely low reproductive rate (typically one young per year), and generally exhibit great loyalty to roosts or roosting areas. Displacement could mean failed reproduction for bats within the impact area. Without knowing the distribution of roosts in and around the construction zone, there is no basis for concluding that impacts would not be significant. **GB.6**

The proposed mitigation measures are also inadequate. The document states for pallid bats, silver-haired bats, and *Myotis* species that: "All loss of snags with dbh of 18 inches or more shall be **GB.7**

mitigated for off-site at a distance of 250 feet or more from the edge of areas cleared for project facilities." Such a measure would only serve as mitigation if these off-site trees were not already occupied by other bats. I see no logic by which it can be argued that removal of snags does not result in a net loss of roosting habitat unless an equal number of snags are generated in equivalent habitat and future snag recruitment is taken into account.

Hydrology/Geothermal Resources. My most serious concern regarding this project involves an issue that is nowhere addressed in the DEIS/EIR -- and this is the potential impact of this project on the ice caves in Lava Beds National Monument. In early September 1997, a radiotracking study (funded by USGS under their Species At Risk program) was conducted to examine the foraging and roosting behavior of *Corynorhinus townsendii* (Townsend's big-eared bat) at Lava Beds National Monument. This site was selected because the cave system at Lava Beds supports the most significant concentration of *C. townsendii* known in California. In the course of this study it was determined that this species, and a number of other species (including pallid bats and special-status *Myotis* species) relied on the ice caves as a source of water. These sites appeared to be sufficiently important for *C. townsendii*, that it is unlikely the population would persist without this available source of water during the summer. The ice cave receiving the most significant use was Heppe, the cave closest to the project area. It is evident from reviewing the DEIS/EIR that relatively little information is available on the hydrology of this area. While the entire project design is based on an assumption that the groundwater system is isolated from the geothermal system, data to document this assumption are not presented. It is my understanding that geothermal resources are dominated by meteoric water. Thus even if the geothermal reservoir is deep, the ultimate source of much of that water is likely to be meteoric. With a projected net loss of 475,000 pounds per hour from the geothermal reservoir, any contribution from groundwater to the recharge process raises the possibility of drawdown and perhaps persistent impacts to the ice caves. GB.8

The document acknowledges that during the construction phase water withdrawals for construction purposes may be sufficient to lower local groundwater levels. Whether these reductions would affect the ice caves also needs to be addressed.

The paths of groundwater circulation in this lava terrain are poorly understood and likely complex. With lava tubes acting as long-distance conduits, it is very possible that drilling activities could make connections between independent aquifers, and change the underground patterns of water flow over a large area in ways that would likely be irreversible. A change in discharge patterns could result in the draining and destruction of ice caves.

Another concern would be potential accidents associated with drilling, production and reinjection processes that might result in the direct mixing of geothermal fluids with the groundwater supply. If such a mixing resulted in alterations to groundwater chemistry or changes in groundwater temperature, there could be adverse, and potentially irreversible, impacts to local ice caves. Geothermal operations in the Long Valley Caldera have lead to lowered discharge in hot springs at distances out to 5 km to the east and increased steam discharge to the west. Ice caves are demonstrably quite sensitive to micrometeorological change (e.g., changes in air circulation) and presumably to local thermal gradients. Ice caves are also potentially sensitive to induced seismicity which could well follow from geothermal reservoir drawdown.

It was also determined by this radiotracking study that individual *C. townsendii* roosting in the Cave Loop system of Lava Beds National Monument travelled up to 7 miles to forage, and were foraging in the forested habitat within the project area. The impacts of this project on the foraging habitat of this species needs to be addressed. GB.9

Sincerely yours,

Elizabeth D. Pierson

Elizabeth D. Pierson, Ph.D.

cc:

B. Bolster, CDFG
G.H. Brimhall, Earth Resources Center, UC Berkeley
C. Dorman, Lava Beds National Monument
G. Fellers, Point Reyes National Seashore
P. Leitner, St. Mary's College
J. Villegas, Modoc National Forest

Letter GC

September 22, 2997

Mr. Randall Sharp
USFS/BLM Fourmile Hill
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA. 96101

Dear Mr. Sharp:

The purpose of this letter is to express my extreme opposition to the proposed Geothermal development project in the Medicine Lake Highlands. GC.1

As a property owner at Medicine Lake, and a licensed Real Estate agent in the Mt. Shasta area, the proposed project will have an adverse effect on property values in the Medicine Lake Highlands. Medicine Lake can be difficult to market for a variety of reasons:

1. Not accessable year round.
2. The cost of building because of hauling distance.
3. County Health Department restrictions.
4. Siskiyou County Building Department restrictions.

GC.2

People who have purchased property in the Medicine Lake area have done so at great expense. For many it has been an investment for future generations to enjoy.

The environmental impact will be devasting to the area. This area was developed for recreational use. Currently 40,000 recreationalists visit the area each year. Snowmobiling is increasing yearly. The appropriate use for the public land in and around Medicine Lake is "recreation", Not Geothermal! Thousands of taxpayers dollars have been spent over the last 30 years to develope the Medicine Lake area as a recreational area for people to enjoy accessible wilderness. GC.3

On Page 4-301 of the draft EIS/EIR it is stated this project will have no effect on Medicine Lake property values. I do not see where in the draft EIS/EIR there is justification for this statement. On the contrary homeowners from Medicine Lake have been very concerned about the negative impact of this project. Please provide a written response as to how this statement was developed and how this project intends to compensate the property owners whose property has been diminished in value as a result of this project. GC.4

Personally, as a citizen, I am appalled that any serious consideration could be given to such a project. There is no need for the limited amount of energy generated by these plants. Further, this is not a "Green Project", there are extensive environmental costs from this project. GC.5

In conclusion, I recommend that the "No Action" alternative is the only choice regarding this project. GC.6

Sincerely,

Carole Plank

Carole Plank
President, Medicine Lake Homeowners Association
605 Glen Mar Drive
Mt. Shasta, CA. 96067

cc: Vice President, Al Gore
Senator, Diane Feinstein
Senator, Barbara Boxer
Mr. Bruce Babbitt, Secretary of the Interior
Siskiyou County Board of Supervisors
Kathy Fisher, BPA
Rich Burns, Alturas Resource Area Manage
Diane Henderson-Bramlette, Modoc National Forest
Barbara Holder, Klamath National Forest
Lynn Sprague, U.S.F.S. Region

JEFFERS AND McLEOD
Real Estate Appraisers

File No. PLANK-1

August 26, 1997

Ms. Carole Plank
Moss Realty
201 W. Lake Street
Mt Shasta, CA 96067

Re: Geothermal plants in Medicine Lake area

Dear Ms. Plank:

As I discussed with you per our phone conversation today, I have no experience with the affect of geothermal plants on market values of properties similar to the Medicine Lake summer home area. But, it is my experience appraising properties since 1973 that any activity which may produce noise, smells or increased traffic in an area with summer cabins such as the Medicine Lake area, would probably decrease the overall market appeal and values after such activity was started. GC.7

Sincerely,

Brent E. Jeffers

September 3, 1997 **Letter GD**

Randall Shary, Project Leader
RE: Fourmile Hill / Telephone Flat Project
Modoc National Forest
800 West 12th. Street
Alturas, CA 96101

Dear Mr. Shary,

I am writing to urge you to oppose the CalEnergy and CalPine geothermal projects. GD.1

This area, the Medicine Lake Highlands, has been designated by Pres. Clinton as part of the Northwest Forest Plan as an old-growth reserve, because of its rich diversity and biodiversity values. It is home to Northern and California Spotted owls as well as many other rare birds. GD.2

The power would not go to California anyway. GD.3

Please keep me informed on this issue. GD.4

Sincerely,

Dolores Plumb
814 Miramar
Rockport, CA 94707

Letter GE

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Sami Jo Pohlman
Address: P O Box 12
Happy Camp, CA 96039
Phone: 916 493-5139

Comments: I am opposed to the "proposed" Geothermal project in the Medicine Lake area. // Medicine Lake has significant social and spiritual value to all Native American tribes in Northern California. I am Native American, and my family has resided in the Macdoel area for over seventy-five years. I believe that the USFS, BLM, and the United States Government are obligated to protect the rights and culture of Native Americans. The Fourmile Hill Geothermal Project is clearly a step in the wrong direction. At one time, Glass mountain was utilized by all tribes in Northern California for the collection of obsidian, used in the making of arrowheads. It was considered a neutral zone, where fighting did not occur. It was also the site of Native American ceremonies. The USFS, BLM, and U.S. Government do not have the right to destroy or disrupt Native heritage and culture. Please show us the respect that you would ask for your people and the protection of their rights. Thank you

GE.1

GE.2

Sami Jo Pohlman

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GF

COMMENT FORM
For the Fourmile Hill Geothermal Project
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We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Sarah Pooler
Address: 722 Buena Vista Ct
Mt. Shasta, CA 96067
Phone:

Comments: Dear Sirs - I am writing this in regards to the Fourmile Hill Geothermal Project. I am concerned about the environmental impact of the proposed project. First of all, I do not see much benefit of the plant (s) // I am also unclear of how many plants are being considered? // Medicine lake is beautiful and unspoiled. I hope that it will not be squandered for a few dollars (which will benefit who?) // It is my hope that you will take this into consideration so that my grandchildren can enjoy this lake.

GF.1

GF.2

GF.3

GF.4

Sincerely Yours,
Sarah Pooler

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GG

Randall Sharp, Project leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

15 September, 1997

Dear Mr. Sharp,

I am writing to express my concern regarding the plans of CalEnergy and CalPine to construct a geothermal power plant in the Medicine Lake Highlands. Such an undertaking would certainly have a detrimental effect on wildlife in the area as it would change the face of the landscape with the proposed electric towers and new roads. GG.1

Please help preserve this old-growth reserve from destruction and protect its natural beauty for future generations. GG.2

Most sincerely,

D.R. Popplewell

D.R. Popplewell
2211 Woolsey Street
Berkeley, CA 94705

cc: Senator Dianne Feinstein
Senator Barbara Boxer

Letter GH

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~25~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Jack Potter Jr Wintu
Address: P.O. Box 1303
Corning Ca 96021
Phone: 916-824-1814

Comments: I feel that if you would like this project to go on you need to Begin construction on the nina, pinta, and Santa Maria as you cross the Atlantic Back to Europe to Dirty up your own Air, you have already filled Our land with fecus and other Human waste Beneath the ground level so leave the Air we Breath Natural and Clean I feel this is another attemp for you and your race to try and recieve a tan as our red people. but Please do it in Europe so only your skins will burn & Brown we are already Shaded and do not wish to change Our appearances As Your Race is always trying to Do. GH.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GI

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~18~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Marma L. Potter Ajumawi Indian
Address: P.O. Box 1309
Corning Ca 96021
Phone: (916) 824-1814

Comments: I oppose it because it will destroy the beautiful land up there, and wildlife. GI.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GJ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please
mit any comments at the close of the public hearing or send comments by September 16, 1997
he address listed at the bottom of the page.

ur Name: Melody Pratt
dress: 210 Sisk View Ave.
Mt. Shasta CA 96067
one: 916-926-5009

mments: I am very much against the proposed geothermal development in the Medicine Lake Highlands. GJ.1

Although I do not have the pleasure of being a property owner in Medicine Lake, I still have appreciated the recreation the area provides.

It is my feeling that the geothermal project will spoil the environment and wildlife. I cannot possibly see putting in something of this proportion and it not in some way having a negative effect on the environment and wildlife. I would like to believe that the Forest Service and the Bureau of Land Management would NOT put money before protecting this unspoiled area. GJ.2

Melody Pratt

f you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GK

September 30, 1997

Mr. Randall Sharp, Project Leader
Fourmile Hill Geothermal Project
USFS/BLM--800 West 12TH Street
Alturas, CA 96101

RE: Comments regarding the Fourmile Hill Geothermal, Proposed Developement.

From: The Atwamsini Band Representatives,
Mary and Wallace Preston
P.O. Box 1315
Alturas, CA 96101

Dear Mr. Sharp,

The Atwamsini Band members are opposed to the proposed Fourmile Hill Geothermal Developement Project, as the proposed developement would adversely impact significant Tribal/Cultural Resources important to the Atwamsini Band members and the Pitt River Tribe. GK.1

As the duly elected representative of the Atwamsini Band, we support and endorse the comments developed by the Tribal Cultural Resources Representative, comments submitted in behalf of the Tribe by Floyd Buckskin. GK.2

We Therefore urge the Forest Service to recommend the " No Project Alternative" and comply with all applicable guidelines. GK.3

Signed:
Wallace Preston
Mary Preston

Letter GL

September 15, 1997

Dear Mr. Sharp,

We are writing to express our opposition to requests by CalEnergy and CalPine to construct a geothermal power plant in the Medicine Lake Highlands. GL.1 It is unconscionable to allow this kind of environmental degredation and destruction to lands in California so that power will be generated for sale to Oregon. GL.2 Regardless of who the power is sold to, we find it completely unacceptible to destroy the ancient forests involved, the wildlife habitat, the roadless areas which help maintain the habitat, and the Indian religious sites. GL.3 We would like to see Medicine Lake Highlands become a national monument. In the meantime, its wild nature needs to be protected. GL.4

Sincerely Yours,
Deirdre & Randy Rand

Deirdre and Randy Randy
PO Box 569
Mill Valley, CA 94942

Letter GM

KEN REED
P.O. BOX 1131
BISHOP, CA.
93515

Randall Sharp
Project Leader

First of all, thank you for the copy of the Fourmile EIR (quite a production!), and for extending the comment period . . .

I bicycled thru the Modoc Natl. Forest this summer . . . good cycling and little traffic. GM.1

I feel strongly that any geothermal developement in this area would be another crime of the sort I would hope we've recognized by now as short-sighted and environmentally unconscionable. // We are against these geothermal projects for all the usual bald-arsed reasons that I'll spare you the listing of. // I am also disappointed in the BLM support of these projects, an agency that has recently appeared to be far more pro-environment than the Forest Service, which granted, isn't saying much . . . You get the picture GM.2 GM.3

Sincerely
Ken Reed
C.N.M.T.

Letter GN

COMMENT FORM
For the Fourmile Hill Geothermal Project
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'e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ɔur Name: Verna Reed
ddress: P.O. Box 501
Fall River Mills, Ca 96028
hone: 916-336-6159

omments: After reading the articles in the newspaper about the proposed geothermal development around Medicine Lake, I am very much against it. I'm sure the people living around it are against it also. I know the wild life and the beauty around this would be changed, as well as area miles away. As it is stated the Forest Service and Bureau of Land Management are paid by us to protect our lands from this sort of thing. Why could this happen? GN.1 GN.2 GN.3

: you wish, you can mail your comments to:
Mr. Randall Sharp
JSFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
lturas, California 96101

Letter GO

November 3, 1997

Randall Sharp, Project Leader
Fourmile Hill/Telephone Flat Projects
U.S. Forest Service
80 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

In response to the environmental impact statement on the proposed Fourmile Hill and Telephone Flat geothermal projects, I oppose and urge abandonment of these projects because of their cumulative adverse impacts on old-growth forests and sacred Indian sites. GO.1

These projects would substantially change the character of these pristine federal lands south of Lava Beds National Monument. GO.2

Many miles of new roads, pipelines, and high-voltage transmission lines would scar the landscape.

Bald eagles, osprey, and other sensitive species may be harmed. GO.3

Thank you very much for considering my input.

Sincerely,

June Ringer

June Ringer

129 East Fairview Ave., Apt. 2
Glendale, CA 91207

Letter GP

Fred L. Rinne
363 W. Bissell Ave.
Richmond, CA 94801

Mr. Randall Sharp
Project EIS/EIR Coordinator

Having read the EIS, I believe the only correct option for the Fourmile Hill Geothermal Development Project is the No Action option. It should not be built as currently proposed. GP.1

The visual effects of the transmission lines on Medicine Lake and the surrounding countryside are appalling, brutalizing the landscape viewshed for miles. GP.2

The project will chip away at the Mount Hoffman roadless area. GP.3

The project urbanizes and destroys a vital Native American heritage area. GP.4

This development, with infrastructure and habitation, will kill wildlife, either by disturbing and harassment, or by electrocution by transmission lines. GP.5

It will generate significant air pollution with machinery, compounds in the steam given off and chlorine. GP.6

It will consume over 1 million gallons of water from a publicly owned well at Arnica Seep - for a private entity. GP.7

The justifications of the Fourmile Hill Project are flimsy. It appears to be another case of corporate welfare the public is justifiably tired of providing. The power from this project could easily be provided by energy conservation, something we seem to have abandoned of late. The promise of jobs reminds me of the Timber Salvage Rider passed by Congress and enthusiastically enforced by the Forest Service. Where is the economic salvation to our rural areas that the Salvage Rider logging produced? The royalties actually returned to the county will amount to $30-$50,000 over 20 years! Pathetic! GP.8

The Fourmile Hill Geothermal Project smacks of yet another corporate boondoggle at the public's expense, and it will not make our region and our Nation a whit more independent in our energy situation.

I respectfully submit the proceeding comments for the public record.

-Fred L. Rinne

Fred L. Rinne

Letter GQ

Randall Sharp, U.S.F.S.,
Alturas, Ca.

227 Monte Vista,
Larkspur, Ca.
94939

August 16, 1997

Dear Project Leader Sharp:

Both the Fourmile Hill and Telephone Flat geothermal very-costly proposals run against the public interest in this unique and pristine region // As has been pointed out, the negative impact on the environment would be severe. The Medicine Lake highlands, the native flora and fauna, the geology, native American ceremonial sites, and recreation will all be severely impacted or destroyed. GQ.1

My wife and I have both been to Medicine Lake. GQ.2

Sincerely,

Walter Rivers

Letter GR

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, Ca 96101

I adamantly oppose any construction of a geothermal power plant in the Medicine Lake highlands region. GR.1

This area has been and still is SACRED to the Pit River, Klamath, Modoc and Shasta tribes for many centuries. GR.2

A presidential order declared this area an old-growth reserve as part of the Northwest Forest plan. Disturbance of this region will DISRUPT and DAMAGE those trees and the entire area. GR.3

I support alternative forms of energy as a good start to sustaining the earth's precious resources, at the same time I am AGAINST anything that violates and stops peoples' abilities to practice religious and spiritual practices. GR.4

Regardless of the advantages of this project- it is wrong to destroy Sacred Places!!
I urge you to....

PROTECT MEDICINE LAKE !
DO NOT DESTROY IT! GR.5

sincerely,

signature Marylee Patricia Rohde
name(printed): Marylee Patricia Rohde
Address: 2557 William St.
Eureka, CA 95501-4123

Letter GS

Anna Rongen
1448 Fourth Street
Los Osos, CA 93402

September 16, 97

Dear Mr. Randall Sharp:

I oppose the geothermal plants proposed by CalEnergy and CalPine. The Medicine Lake Highlands should be protected as a park, and the sensitive environment is worth more aesthetically and economically if left intact. GS.1

Please, no manipulation of the magnificent highlands is worth it, and geothermal runs out eventually; but the land is scarred for generations to come. GS.2

This land belongs to the people, not just one or two businesses. Fair and equitable multiple-use would mean at least 50% of Modoc would be wilderness officially. This is not so much when one considers over 95% of our ancient and majestic forests have been logged on public land. Was this fair??

Please protect all of the highlands, and include my comments as official input. GS.3

PS: will it be left pure & pristine? THANK YOU, Anna

Letter GT

Please oppose both the Fourmile Hill and Telephone Flat geothermal projects. GT.1

RECEIVED
SEP 02 1997
MODOC N.F.
ALTURAS, CA

John Savarese
74 Mobile Ave.
Staten Island NY
10306

Letter GU

ROBIN LAWRENCE SCHAEFFER, PH.D.
HELENE SCHAEFFER, PH.D.
A PSYCHOLOGICAL CORPORATION

CLINICAL PSYCHOLOGY
APPLIED PSYCHOPHYSIOLOGY

PSYCHOLOGY LIC. PSY4043
PSYCHOLOGY LIC. PSY5185

225 WEST GRANGER AVENUE
MODESTO, CALIFORNIA 95350-4470

TELEPHONE: (209) 577-0883
FAX: (209) 577-0889

September 15, 1997

Mr. Randall Sharp
Project Leader
Fourmile Hill and Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am writing to express my strong opposition to both the CalEnergy and CalPine geothermal projects. The land involved is sacred to our people. There are ceremonial sites there that have been used since the beginning. This is not an area that should ever be violated. GU.1 GU.2

In addition to the religious reason to oppose these projects, rare old growth exists in this area that is fast disappearing from the planet. This great national treasure is given us by the Creator. It must not be desecrated before it can receive the national monument status it deserves. GU.3

Thank you for considering my views. Please let me know what you decide to do on this. I'll look forward to hearing from you. GU.4

Sincerely,

R Schaeffer Ph.D.

Dr. Robin L. Schaeffer

Letter GV

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: R. J. Schwartz Family
Address: 300 N. Washington Dr.
Mt. Shasta, Calif. 96067
Phone: ?

Comments:

No! No! No!
It will ruin one
more wilderness area
for the people in the
Mt.'s —
No!

GV.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GW

Fai Schwarzenberg
7800 French Creek Road
Etna, CA 96027
August 19, 1997

Randall Sharp, Project Leader,
Fourmile Hill/Telephone Flat Projects
USFS - 800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I am outraged to hear of the proposed geothermal development in the vicinity of Medicine Lake. My husband and I have lived in Siskiyou County for 45 years, and have spent many happy times in the area, visiting not only Medicine Lake but the whole volcanic area there.

I feel this development would be a great mistake, a 100 million dollar construction which would not be cost effective in the first place, would not benefit the citizens of California, but most of all would be environmentally destructive. Not only would this pristine lake be affected, and the area in its vicinity destroyed, but the flora and fauna, the geology, the Native American ceremonial sites, and the recreational use of the area would be severely impacted. GW.1 GW.2

So I would like to register my strong objections to the development of the geothermal projects in the Medicine Lake area. The USFS should be representing the people who own this area, and not the financial interests bent on destroying it. GW.3 GW.4

Yours sincerely,

Fai Schwarzenberg

Fai Schwarzenberg

Letter GX

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please bmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

our Name: David Self
ddress: 2495 Deer Trail Ln
Cameron Park CA 95682
none: 916-676-1054

omments: I would appreciate a copy of the draft EIS/EIR and the time to compile reasonable responses. An extension of the comment period would thus be greatly appreciated. The Medicine Lake and Shasta and Vicinity are of great importance within a rather broad region as well as locally and thus the process should elicit and give reasonable time for comments from afar. GX.1 GX.2

Thank you for your consideration

f you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter GY

September 29, 1997

Dear Mr. Sharp,

We are writing this letter to express our deep concern over the proposed 4 Mile Hill geothermal project and the accompanying power lines. It does not seem reasonable to put such a massive project with all it entails in such a fragile environment. The bordering Medicine Lake Caldera and Lava Beds National Park are themselves very unique and worthwhile. They should not have to be subjected to this project. GY.1

In the last fifty years we as a progressive people have created many of our own environmental problems. There is an opportunity here NOT to create another one. We are hopeful that the decision makers choose not to go with this project and opt for alternative #7-NO ACTION. We like to believe that there will be unspoiled areas for our grandchildren's grandchildren. GY.2

Thank you for your time.

Sincerely,

Michael L. and Janet K. Server

Michael L. and Janet K. Server and Family

Letter GZ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

'e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ɔur Name: HARRY and BETTIE SHOTT
ddress: 300 SHELDON AVE
MT. SHASTA, CA 96067
hone: (916) 926-6075

omments: We are opposed to the Fourmile Hill Geothermal Project for the following reasons:
1) The Medicine Lake area is a remote recreational area. The people that go there want the quiet and peacefulness that is unique. GZ.1
2) The Geothermal project will be intrusive with noise and surface pollution.
3) Because of these negative aspects, those of us that have property there will lose in property values.

It was bad enough when the wells were being dug. A thumping noise night and day. From what we understand, there will be noise day and night with these plants. At night it is so quiet you can hear a sneeze across the lake. Imagine what the plant noises will be like! GZ.2

f you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
300 W. 12th Street
Alturas, California 96101

September 27, 1997

Mr. Randall Sharp
800 West 12th Street
Alturas, CA. 96101

Re: Fourmile Hill Geothermal Project: Comments to Draft EIR/EIS

The purpose of this letter is to provide specific comments and to raise pertinent questions to the draft EIS/EIR. Many of the issues of this letter are raised without the necessary information that has been requested by various parties, but has not been received. Without the necessary information, a reasonable analysis of the proposed project is not possible. HA.1

At the Medicine Lake public hearing, Mr. Sharp, requests were made to extend the comment period to October 30, 1997. Your reply to the request was "I see no problem with that". Still the comment period was just extended to September the 30th, and not the later date. Please consider this to be a second formal request to extend the comment period to October 30th. Please respond in a written response if this extension is not given. I reserve the right to comment and question issues of this project. HA.2 Please be advised if the lead agencies approve this proposed project an appeal is for sure. HA.3

The questions and comments of this letter are the result of trying to give an analysis on a very poorly prepared document. The inadequacy and length of the EIS/EIR, along with the lack of information requested in a timely manner makes a reasonable response very difficult. It makes one wonder why the urgency for pushing this project forward when all the time in the world should be utilized in making the decision of Fourmile Hill. The Geothermal resource will not deplete during the comment time. We must all, U.S.F.S., B.L.M., B.P.A., Siskiyou County Supervisors, Calpine, and all concerned parties, thoroughly evaluate all the information before making this important decision. HA.4

I. PURPOSE AND NEED

At the August 30th, public hearing at Medicine Lake, Mr. Sharp, you informed the general public that the proposed action was a pilot project for the BPA. You stated that BPA consumers were surveyed and a certain percentage conveyed they would prefer a renewable resource producing electrical power for them. In the final EIS/EIR please discuss the justification of a pilot project in relationship to the issue of short term productivity to long term adverse effects to the environment and region. CEQA 15126(E) HA.5

What was the percentage of consumers surveyed that stated they wanted this type of resource? Why wasn't this discussed in the EIR/EIS? Were the consumers aware of the type of area this resource would be developed in? Geothermal energy has a higher cost than other energy sources, such as natural gas or coal. Page 2-79. In general, geothermal energy is second in cost to nuclear power. Has the BPA consumers been informed of this, and do they realize that they could be stuck with stranded investment charges? Please give a written response to these questions.

2. CUMULATIVE EFFECTS:

The interim scoping report for the proposed action on Page 25 states, the transmission line voltage of 230 KW was selected to accommodate potential future development in the Glass Mountain KGRA. (Footnote: the lower voltage may not adequately accommodate with future development) A 230 KW transmission line can accommodate six power plants. The Fourmile Hill project is the first, Telephone Flat is next, and at the August 30th, meeting at Medicine Lake, you admitted that Mt. Hoffman was already on the drawing board. Now we are up to three! By not addressing this capability the whole EIR/EIS is in direct violations of NEPA Code: 1508.7, Cumulative Impact, and CEQA Code: 15165. Not one section in the EIS/EIR addresses the total cumulative effects of the foreseeable future. HA.6

The Siskiyou County Air Pollution Control District is the lead CEQA agency and a permitting agency. The S.C.A. P.C.D. is led by Patrick Griffen, Siskiyou County Air Pollution control officer, and the Siskiyou County Board of Supervisors. NEPA Section 1507.2 states, each agency shall be capable (in terms of personnel and other resources) of complying with the requirements below. Such compliance may use others resources, but the using agency shall itself have sufficient capability to evaluate what others do for it. It is apparent that five supervisors are not air pollution experts. HA.7

Page 3-15 EIS/EIR states, no detailed analysis of lake water chemistries, that include concentrations of metals and organic compounds is available. Page 4-37 EIS/EIR states, based on the geology and undeveloped nature of the Medicine Lake watershed, it can be ASSUMED that existing concentrations of the analyzed constituents in Medicine Lake would be extremely low. That these background concentrations combined with project deposition would not be sufficient to cause an exceedance of a water quality standard; therefore, it can be REASONABLY CONCLUDED that air emissions from the project would have an adverse, but not significant impact on the water Quality of Medicine Lake. NEPA Section 1500.3 (B) and CEQA Section 15151: Environmental impact statements and reports shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the HA.8

necessary environmental analysis.

In summary, Mr. Sharp, I am asking that there be a full assessment of the areas I have addressed in the draft EIS/EIR. I believe there is no economic justification for this project, and I have serious questions about parts of the draft EIS/EIR. HA.9

Sincerely,

James Shott

James Shott
605 Glen Mar Dr.
Mt. Shasta, CA. 96067

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please mit any comments at the close of the public hearing or send comments by September 16, 1997 he address listed at the bottom of the page.

ir Name: David Smith
dress: PO Box 600
Burney Ca 96013
one: 916-335-2208

mments: My family - owns property at Medicine lake - and have used this lake since the early 60s - We are opposed to the Geothermal project. projected for Medicine lake. We feel this is a poor project for this area. HB.1

you wish, you can mail your comments to:
Ir. Randall Sharp
SFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
Jturas, California 96101

Letter HC

91 POWWOW RIVER ROAD
EAST KINGSTON,NH 03827

September 23,1997

Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project
EIS/EIR Coordinator
800 W 12th Street
Alturas, CA 96101

Randy;

My main comment on this project is the same as it has been from the beginning: **STAY OUT OF THE MEDICINE LAKE CALDERA AND RECREATION AREA!!**

Table S-4: Comparison of Key Issues for Alternatives, clearly shows that Alternative 5 is less impacting in eleven (11) out of the twenty-six factors considered, and more impacting on only one. It could also be argued that Alt. 5 is also the environmentally preferred alternative, since the only significant difference between this and Alt. 6 is the temporary impact of transmission line construction in the vicinity of Tionesta. The nearest residence at Tionesta is 1500' from the proposed line, and impacts are expected to last for less than a week, hardly a significant impact when compared to those that would occur should the line be routed through the caldera and recreation area.

Other factors in favor of Alt. 5 are:

- No released roadless areas are affected, not that you have to worry about these anymore anyway (where did the term "roadless release area" come from?). HC.1
- There are no special status species on segment A3.
- There are no sensitive plant communities on segment A3.
- There would be no conflict with summer recreational access to Medicine Lake.
- Recreationists on Medicine Lake wouldn't have their view cluttered up by a power line stretching across the horizon.
- The transmission line would be 0.2 miles shorter, therefore somewhat less expensive to build.

In short, it should be obvious what the preferred alternative for this project should be, and it probably didn't need a five pound ($10/copy to mail) EIS to demontrate this.

Sincerely,

LS

Lawrence K. Smith
USFS, Retired
(Modoc NF Environ. Coord)

Letter HD

30 September 1997

Mr. Randall Sharp
USFS/BLM
Fourmile Geothermal Project EIR/EIS Coordinator
800 W. 12th Street
Alturas, California 96101

Subject: Comments on EIR/EIS for the
Fourmile Hill Geothermal Project, Modoc/Siskiyou Counties, California

Dear Mr. Sharp:

This letter presents comments on the subject EIR/EIS. I am a Registered Geologist and Professional Engineer in the state of California and am deeply concerned with the lack of information available to adequately review the proposed geothermal project. Based on a review of the subject report, there appears to be insufficient data to evaluate the potential environmental impacts due to the proposed project or determine the need for the project, in accordance with the intent of the Geothermal Steam Act of 1970 and the Energy Policy Act of 1990. In addition, my family has owned a residence near Medicine Lake for more than 30 years and I am also concerned with the evaluations contained in the report regarding the visual effects, and the effects to wildlife and vegetation due to the project. HD.1

The following presents specific comments:

- On Page 1-14, it is reported that the exploration testing to determine whether this is an economically feasible project has not yet been done. The need for this project cannot be established without this information. Additionally, it appears that the scope and evaluation of this project has been based primarily on the information from one well (88-28). HD.2
- Figure 3.3-3 presents a potentiometric map of the project area and vicinity. There appears to be no basis supporting this map. The map apparently assumes that all wells in the project vicinity are screened across the same water bearing zone (this seems unlikely); boring logs and/or well construction information for these wells were not provided. Additionally, Figure 3.4.2 indicates that Medicine Lake is not connected to the shallow groundwater aquifer. Again, no basis for this interpretation is provided nor does data appear to have been collected that support this conclusion. HD.3 HD.4

- Page 3-41 states that shallow groundwater within the caldera is "probably" separated from shallow groundwater outside the caldera, further supporting that insufficient data has been collected to evaluate the hydrogeology of this area or the possible effects that this project will have on the shallow groundwater aquifer or Medicine Lake. HD.5

- In several places in the EIR/EIS, it is indicated that no information has been collected on the volume of available geothermal fluids, the reservoir's ability to recharge, source of fluids for recharge or even whether these fluids exist. Figure 3.4-3 suggests that it is unknown whether a reservoir even exists below the "impermeable zone". It would seem that this is critical information for evaluating the viability of this field: if there are insufficient fluids or little to no recharge capability, the productivity of this resource is questionable. It does not appear possible for the BLM, USFS, or the public to evaluate the need for this project or the cost/benefit of the project without this information. HD.6

- Additionally, the report admits that the lateral extent of the "impermeable zone" is unknown. If the "impermeable zone" is not laterally continuous, as suggested by the report on page 3-39, recharge could come from the shallow groundwater aquifer. Therefore, without this information, the possible effect on the quality or quantity of water in the shallow aquifer, or on Medicine Lake, cannot be evaluated. HD.7 The report states that a monitoring program will be implemented to evaluate shallow groundwater quality; however, without additional knowledge of the geology and hydrogeology in this area, the monitoring program cannot be effective or protective of the environment. As described above, the interpretation of the hydrogeology of the project vicinity is not supported by data and the understanding of the subsurface lithology is based on about a dozen wells over an approximately 30 square mile area. HD.8

- It is unclear why groundwater extraction from the Arnica Sink well is needed. The EIR/EIS states that a water well will be installed near the plant area during the second year of construction activities. Installing a water well near the plant prior to initiating plant and geothermal well construction activities would alleviate the need for the water line from Arnica Sink to the plant area and the destruction of National Forest land along the 50-foot wide corridor reportedly needed for the water line. HD.9

- Page 4-22: 21.3 million gallons is 65 acre-feet not 6.6. HD.10

- The report indicates that dust ("PM^{10}") could be a concern during plant and transmission line construction. Volcanic rock often contains heavy metals; however, an investigation and risk evaluation on the effects of the dust on construction worker health or the environment (e.g., birds) during was not performed. HD.11 Additionally, the report states that wind blows from the project area towards Medicine Lake about 11 percent of the time; however, the effects of dust blowing to Medicine Lake was not evaluated. HD.12

- Page 4-36 describes an evaluation of potential air emissions from the geothermal project on water quality. However, concentrations of the chemicals of concern in the geothermal fluid have not been analyzed. Without information on the chemical concentrations contained in the fluid (e.g., the source of the emissions), estimates on the air emissions and conclusions from the air emissions modeling have no basis. Therefore, the environmental effects of these emissions cannot be evaluated. HD.13

- The mitigation measures for water quality from these emissions considers only criteria that are protective of human health, not the environment, as required by California and federal law. Water quality criteria for aquatic organisms should be considered and included in monitoring evaluations. HD.14

- Page 4-39 indicates that water from precipitation that accumulates within secondary containment areas would be directed into one of the surface sumps for eventual re-injection if "uncontaminated". The report does not state what monitoring and analyses would be performed to determine whether or not the liquid was "uncontaminated" nor the regulatory agency that would oversee this monitoring. HD.15

- The Key Observation Points (KOP) were not discussed with the general public, nor, does it appear was input sought from homeowners at Medicine Lake. HD.16

- The power plant is in a "retention" area for Visual Quality Objectives (VQO); therefore, construction of the plant would appear to be inconsistent with upholding this objective. HD.17 Additionally, the EIR/EIS states that segment A1 is in retention, partial retention, or modification VQO areas; however, Figure 3.9-2 indicates this segment intersects a preservation zone. HD.18

- It is unclear why segments A1 and A2 are the "preferred alternative". Based on the EIR/EIR, these segments would cause significantly more environmental impact to vegetation and wildlife than segment A3. HD.19

- What is meant by "standard drinking water quality constituents" (p.4-26)? HD.20 Also, if groundwater availability appears to be affected by plant operations, extraction should be reduced whether or not this could be attributed to operations of the geothermal plant (p. 4-26). HD.21

I appreciate the opportunity to comment on this report. However, for the record, I would like to note that I received the EIR/EIS just over two weeks before the extended deadline for submittal of comments. This is not a sufficient amount of time to be able to review a report that is more than 700 pages in length. HD.22

Sincerely,

Amanda Spencer, R.G., P.E.

July 29, 1997

Mr. Randall Sharp
USFS / BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I write to you from Medicine Lake (hence the informal stationary) where three generations of my family have had a cabin since 1963. I write to you to express the very great concern we all feel about the proposed Geothermal Development Projects for the Medicine Lake area.

In addition to nearly 35 summers spent at our family cabin, I have a B.A. in Geology (focus on vulcanology) and a Ph.D in Environmental Ethics. I spent the summer of 1980 as a field geologist with the U.S. Geological Survey, mapping the Medicine Lake caldera with Julie Donnelly-Nolan. I know the Medicine Lake area very well, having walked most of its area on foot and doing a detailed geologic study of the area. HE.1

My current focus in environmental ethics is on developing sustainable long-term relationships between humanity, other members of the ecosystems where humans live and recreate, and the biologic + geologic processes that shape the earth. In general I am supportive of geothermal energy, 1) when there is a demonstrated regional need, and 2) when it can be developed with no short or long term damage to local

ecosystems and human environments

After studying the documents sent by the BLM on June 1, 1996, reading over the detailed environmental assessment plans, and talking to concerned citizens in Tulelake and members of Medicine Lake Homeowners Association, I believe the proposed Geothermal Development Projects for Medicine Lake fail on both accounts: HE.2

① There is no demonstrated local energy need for this project; hence the ecological and economic costs far outweigh the short-term proposed benefits // I am adamantly opposed to developing + damaging the natural ecological balance of one area - in this case, Medicine Lake - to satisfy corporate energy interests + greeds far from this area. HE.3

② The short-term economic gain and the needed large-scale infrastructure development needed to support it do not justify the potential + likely damage to both the unique ecological balance of the Medicine Lake area and the long history of low-impact recreational use. As I am sure you are well-aware, Medicine Lake is home to a unique ecological-geological assemblage that includes nesting bald eagles, osprey, and spotted owls, many migratory birds, and larger threatened (in California) species such as mountain lions, black bears, pine martens, and bobcats. As a teacher of Native American religious studies, I am aware of the sacred values of this area to its Native American forebears as well, HE.4

To conclude, it has taken many years of careful planning and debate to achieve the current balance of low-impact human recreational use, environmental protection, and low-impact resource use. The Geothermal Development Project would be a major factor in upsetting this balance and greatly damaging it for the foreseeable future. HE.5

Please include me on any future mailings + reports that have to do with the Medicine Lake Geothermal Development Projects. Send this to: HE.6

Drake
DRAKE UNIVERSITY

DANIEL T. SPENCER, PH.D.
PROFESSOR OF RELIGION & ETHICS

DEPARTMENT OF PHILOSOPHY & RELIGION
MEDBURY HALL 208
DES MOINES, IOWA 50311-4505
TEL: 515-271-2885
FAX: 515-271-3977

E-MAIL: ds5391r@acad.drake.edu

Sincerely,

Daniel T Spencer, Ph.D.
Professor of Religion + Ethics
Drake University.

P.S. I am particularly opposed to any development inside the Medicine Lake Caldera // I am astonished that Proposed Route ① for the transmission line is routed within the caldera and between the Medicine Lake Dacite Flow and the Compgrounds on the north side of Medicine Lake. How can HE.7 HE.8

such an obtrusive and ludicrous idea have even reached the planning stage?? If this is an example of the proposed project's sensitivity to environmental + recreational interests at Medicine Lake, it is cause for even greater concern. NO ECONOMIC DEVELOPMENT INSIDE THE MEDICINE LAKE CALDERA!!

cc: Senator Diane Feinstein, California
Senator Barbara Boxer, California
Senator Tom Harkin, Iowa
Secretary Bruce Babbitt, Dept of Interior

Drake
DRAKE UNIVERSITY

DEPARTMENT OF PHILOSOPHY AND RELIGION

September 25, 1997

Mr. Randall Sharp
U.S.F.S./B.L.M. Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

I write to you today in follow-up to my letter of July 29, 1997 (still unacknowledged by your office) out of a deep sense of urgency and frustration: urgency, because the public comment period on the future of the Medicine Lake Highlands and the proposed Geothermal Development Project at Fourmile Hill will close on September 30, 1997; frustration because despite my repeated attempts via letter and three phone calls to your office over the past two months, your office never furnished me with a copy of the EIS/EIR report which would be necessary to give a more informed commentary on the proposed geothermal project. I therefore wish to lodge an official complaint and protest about the unsatisfactory process your office has provided for public response to the proposed geothermal project(s) on the Medicine Lake Highlands. If public comment on the project is fairly solicited, we must be given fair and adequate access and time to the project materials in order to make informed comments. HF.1

When it became clear that I would not receive a copy of the EIS/EIR before the expiration date of the public comment period, I was able to get a friend to fax to me a copy of the 19-page Executive Summary (ES). I will therefore address my concerns to the conclusions and points raised in the ES. I ask, however, that you extend the comment period for the 800 page EIS/EIR to at least December 30, 1997, and that you send to me in a timely manner a copy of the EIS/EIR so that I can review the full report. To not extend the comment period and provide full access to the project materials and reports is to make a mockery of citizen commentary and input on the project. HF.2

With respect to my qualifications to comment on the report:

(1) My family has had a cabin at Medicine Lake since 1963, and I have spent nearly every summer and parts of some winters since then at the Medicine Lake Highlands. I know the Highlands intimately, and am very familiar with each area that would be affected by the proposed project.

(2) I am a trained field geologist with experience in mapping volcanics. During the summer of 1980 I worked for the United States Geological Survey as a field geologist mapping the Medicine Lake Highlands with project manager Julie Donnelly-Nolan of the USGS Menlo Park office. I have personally walked most of the area inside the Medicine Lake Caldera, and have done extensive field work on the northern and eastern sides of the Highlands, through which the proposed transmission lines would pass. I have maintained regular contact with Ms. Donnelly- HF.3

206 MEDBURY HALL DES MOINES, IOWA 50311-4505

Nolan about the progress of the geological mapping of the Highlands, and most recently spoke with her in August, 1997. I am very familiar with the geology of the Medicine Lake Highlands, both in terms of its geothermal potential and its many distinctive surface geological, biological, and ecological features.

(3) I hold a Ph.D. in Ethics with a focus on Environmental Ethics. My main area of research and teaching is in the area of building sustainable ecological and social relationships between human society and the rest of the natural world, while respecting the integrity of nonhuman nature. Given the deleterious effects of human use and exploitation of natural resources throughout the U.S. West to this date, such sustainability requires a fundamental rethinking of our relationship to and use of nonhuman nature if we are going to make the much needed social transformation of society towards ecological and social sustainability.

After reading through the Executive Summary and the other project descriptions made available through mailings of the Medicine Lake Homeowners association, I oppose this project strongly on both philosophical and pragmatic grounds. At the philosophical level, development of this project would only continue the exploitative, utilitarian relationship of humans toward nature that has led us into the current environmental crisis. The ES itself alludes to this when it states on page S-1 "The Glass Mountain KGRA represents one of the only remaining undeveloped Known Geothermal Resource Areas in North America with a demonstrated resource." The logic informing the entire ES is "if we *can* exploit this resource, we *should* exploit it." Rather than continuing this logic of hunting down and exploiting every last natural resource for human consumption, however, what is needed is a fundamental rethinking of human energy use and consumption. Developing the geothermal project at Medicine Lake only feeds an addictive energy consumption pattern that can never be satisfied, rather than addressing the roots of the addiction itself. HF.4 HF.5

Beyond this philosophical objection, there are many pragmatic and ethical reasons for objecting to this plan. What follows is a page-by-page commentary on the Executive Summary, which I stress again, is the only part of the EIS/EIR to which I have had access to this point.

Page S-1: For a project that will cause ecological, biological, cultural, spiritual, and recreational harm to a pristine natural environment as the ES makes clear this project will, there must be *compelling* economic reasons that justify the harm. I find no such compelling reasons or economic justification anywhere in the report; rather it is simply asserted that the "need [whose need?] for the project was stated by the U.S. Geothermal Steam Act of 1970, the Federal land Policy and Management Act or (sic) 1976, and the Energy Policy Act of 1992. Rather than demonstrating what the compelling "need" for this project is, the next sentence says only that the proposed project "is consistent" with these Federal regulations. As any college instructor of writing and rhetoric can tell you, there is quite a difference between demonstrating that something *is consistent with* a set of regulations and demonstrating that there is *a need* for the project. This kind of collapsing of logic and assumptions occurs throughout the ES, consistently *asserting* the need for this project, rather than *demonstrating and justifying* this alleged need. Allowing Calpine, BPA, CalEnergy, or any other energy utility to develop this project so that they can advertise to consumers that they now produce "green energy" [a phrase that effectively hides the environmental harm the production of this energy would cause]—even though this electricity would cost twice the rate of electricity on the current market—does *not* demonstrate a compelling need for this project. It is difficult to see from the ES how the proposed benefits would outweigh the many harms of this project, especially since most of the economic benefits would leave the Medicine Lake area, while the damages are left behind. HF.6

I am struck that on page S-1 the Bonneville Power Administration is listed as a cooperating Federal agency in overseeing the EIS/EIR. Since BPA has a clearly vested interest in the energy HF.7

produced by this proposed project, this role would seem to represent a clear conflict of interest.

Page S-3: In the listing of groups notified under the Scoping Process, conspicuously absent are the Medicine Lake Homeowners Association (MLHA) and the users of the USFS Campgrounds at Medicine Lake. As a member of the MLHA, I was not notified of the full extent of this proposed project until this Summer, 1997, at which point it was not possible for me to attend the August 30, 1997 meeting with you and the Calpine representative; similarly, your office has not furnished me with a copy of the EIS/EIR which has effectively limited my participation in the public comment period. It is impossible not to conclude that the real intent of this process is to rush through approval of the project by limiting public access to vital information and adequate time to study and respond to the documentation. HF.8

Pages S-3 and S-4: As a professor of religious studies, I regularly teach about issues of American Indian religion and spirituality and conflicts with white land-use projects. While I do not presume to speak for the tribal members who have voiced their own concerns about the project, I fully endorse the concerns they raise for how this project would disrupt their traditional religious practices. HF.9

Page S-5: I am concerned about the effects on Medicine Lake of using Arnica Sink as a water supply for well drilling activities. As you know doubt know, the lake level of Medicine Lake is very sensitive and has fluctuated wildly in the past 20 years due to varying snowfalls and the drought years of the '80s. What guarantees are there that drilling and pumping water from Arnica Sink--less than 2 miles from Medicine Lake--would not harm both the quality and quantity of water reaching Medicine Lake through the water table in the caldera? HF.10

Transmission Line: I continue to be **flabbergasted** that the primary proposed routing for the transmission line is the A1-A2-B1-C1 routing that runs the transmission line **into the caldera and between the north shore of Medicine Lake and the Medicine Lake Dacite flow--right by the campgrounds, Little Medicine Lake, the road, and the hiking and biking recreational trails.** I find this proposed route astonishing for its total disregard for the recreational development of Medicine Lake--development that has for over 30 years sought to balance recreational and ecological needs in the caldera. As the EIS/EIR apparently states on P. 3-124[1] "Medicine Lake is located at the visual and topographic center of the Caldera. There are *no telephone or electricity service lines serving the basin. Combined, these characteristics create a strong sense of place and remoteness to the lake.*" It is precisely that "strong sense of place and remoteness to the lake" that is threatened and would be destroyed by developing this project, **and in particular** Alternative 1 of the proposed Transmission Line. HF.11

Project Lifespan and Decommissioning: The ES states that "all disturbed areas would be restored to pre-project conditions as practicable *and/or to conditions acceptable to the USFS and the BLM.*" In addition to the loss of these disturbed areas during the estimated 48 years of construction and operation (the lifetimes of our children and grandchildren), there is no guarantee that there would be viable and significant restoration at the end of the project, since this clause makes it subject to decisions of the USFS and BLM, who are hardly perceived as neutral arbiters in this conflict, and who may have very different mandates and policies a half century from now. HF.12

Pages S-6ff: Alternatives Comparison: Because I have not had access to the full EIS/EIR, it is not possible for me to evaluate the criteria the ES uses in distinguishing between "effects," "adverse effects," and "significant adverse effects." By what criteria are adverse effects HF.13

[1]Suzanna S. Cuneo, personal communication.

considered "less-than-significant"? I note, for example, that this is the category used to describe the effects to general wildlife and special status species. How do you arrive at this conclusion? For at least the past 20 years we have enjoyed a nesting pair of bald eagles each summer at Medicine Lake, and in the past decade there have also been ospreys on the lake. I am very well aware of what happens to these large, threatened birds of prey when they tangle with transmission lines, as is very likely to happen, particularly if these lines are run near the lake where these birds regularly roost. How many dead and electrocuted eagles and osprey would it take to move this effect from "adverse" to "significant"? Clearly given the population levels of these and other birds at Medicine Lake, the loss of even one bird would be significant, yet this is not acknowledged in the report. Given this kind of evaluation in this case, how are we to assess the evaluations of the report on other areas where the effects are listed as adverse, such as the effects on the Medicine Lake water quality, effects to historic or archaeological resources, effects on traditional cultural values and uses, effects on vegetation, effects on views from Medicine Lake and Lava Beds, air quality from power plant emissions, and effects of the noise from construction and operation? The effects of any one of these factors would be of significant concern, **their cumulative effects would be devastating to the Medicine Lake Highlands.** HF.14 HF.15

Page S-10: Given these cumulative effects, the ES rightly concludes that "The No Action alternative would therefore be considered the environmentally preferable alternative;" yet the ES goes on to say that it would not meet "the purpose and need" for the proposed action. Once again, the alleged "need" for the project is merely asserted rather than demonstrated. A much more compelling case for the "need" for this project must be made to an informed public before it can be justified. HF.16

Page S-12: Cumulative Effects: the ES rightly concludes that "The project could result in significant cumulative effects through the potential for conflicts with religious use of the area by local tribal members. The temporary noise and air quality effects from project construction could be cumulatively significant *if they overlapped with other projects, such as the proposed CalEnergy Telephone geothermal project.*" This is a major weakness of the whole ES and EIR/EIS: **there is no comprehensive study of the cumulative impact of the many (up to 6) different geothermal projects being considered for the Medicine Lake Highlands.** I am all too familiar with what has happened to the region of the Geysers Geothermal Projects north of San Francisco: **the cumulative effects have destroyed the ecological integrity and original beauty** of that once pristine area. Yet at least the proximity of the Geysers to the San Francisco Bay Area can provide some justification for its development. **There is no similar justification for developing the Medicine Lake Highlands,** which lie hundreds of miles from the nearest metropolitan area and represent on of the last pristine volcanic-geothermal-ecological complexes in the country. HF.17

Pages S-13ff: Summary of Environmental Consequences and Mitigation Measures: This chart presents a dramatic picture of the potential and likely cumulative damage to the Highlands of this project. There are several categories where even after the recommended mitigation efforts the level of significance of adverse effects remains at the significant level, including effects on cultural resources, effects on Medicine Lake Highlands, effects of project noises on traditional sites and uses, effects on landscape views, and effects on Medicine Lake views. There are many other categories where the effects are listed as significance prior to mitigation, yet less than significant after mitigation; **by whose criteria and according to whose values and assumptions are these effects deemed less than significant?** What guarantees are there that the anticipated significant adverse effects on wildlife and vegetation (4.7 & 4.8) can actually be successfully mitigated to "less than significant," and again, **by whose criteria and according to whose values and assumptions are these effects deemed less than significant?** And of course, even the ES acknowledges that no mitigation efforts will significantly reduce the adverse HF.18 HF.19 HF.20

effects on Medicine Lake Views (4.9.5), effectively ruining what the EIS/EIR itself describes as the "sense of intactness to the lake's character." (p. 3-124)

Under Section 4.11: Land Use and Recreation, how in the world can the authors of the EIS/EIR conceivably conclude that effects on the overall recreation experience, effects on developed recreation use areas, and effects on Medicine Lake residences would be "less than significant"?? Again, **by whose criteria and according to whose values and assumptions are these effects deemed less than significant?** Have you consulted those of us who have been visiting Medicine Lake for the past 30-40 years to see whether or not viewing power lines across the lake, listening to year-round construction and operational noises, having the pristine star-gazing from the lake now impaired by lights from the plant, a developed industrial infrastructure in a formerly pristine natural environment, construction and operation emissions into the incredibly pure and thin mountain air, etc., etc., etc.--whether we view these cumulative effects as "less than significant" to our recreational and residential experience? Any one of these effects, let alone their cumulative impact, will forever and irreparably damage precisely what we regularly return to Medicine Lake for (in my case a one-way trip of 2000 miles that I make each summer): a pristine natural environmental and geological/ecological/cultural wonder, unique in North America, where recreational and ecological needs have been maintained in a careful balance. **Developing the geothermal power project is not simply one more "multiple use" added to this careful balance; it is fundamentally incompatible with the other recreational and ecological interests and irrevocably damaging to them.** HF.21

In summary, Mr. Sharp, I am asking that a fair and accessible assessment process be put in place to allow concerned citizens both the time and access to full documentation needed to provide informed commentary on this project. HF.22 I believe that there has been no demonstrated **economic justification** for the project, HF.23 and that there are numerous and serious adverse **ecological and recreational effects whose cumulative deleterious impact has been seriously underestimated or ignored.** HF.24 Given the evidence I have been able to examine so far, I believe that Alternative 7, the "no development" option, is the only wise and prudent course. With a wise and far-sighted national and regional energy policy there would be no perceived need whatsoever for this ill-designed energy project; even under the best of circumstances the sacrifice of the Medicine Lake Highlands for a temporary increase in electricity cannot be justified. HF.25 If the plant is built we will deprive both our children and nonhuman kin the opportunity to enjoy and thrive in this unique environment.

Sincerely,

Daniel T. Spencer

Daniel T. Spencer, Ph. D.
Assistant Professor of Religion and Ethics
Dept. of Philosophy and Religion
Drake University
Des Moines, IA 50311

Tel: 515/271-2885; Fax: 515/271-3977; e-mail: daniel.spencer@drake.edu

cc: Senator Diane Feinstein
Senator Barbara Boxer
Senator Tom Harkin
Secretary of the Interior Bruce Babbitt
Vice President Al Gore, Jr.

LORIN C. SPENCER 1894 NORTH EUCLID AVENUE UPLAND CA 91784
Phone: 909-982-7561

September 18, 1997

Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, California 96101

Dear Mr. Sharp:

I wish to comment specifically about paragraph 4.11.1-Effect on overall recreational experience--page 4-191. I believe the paragraph should be changed to read as follows:

"Construction, operation and decommissioning of the proposed project will affect the general recreational experience in the vicinity by affecting the overall character of the area as defined by its sights, sounds and air quality. This would be considered an significant adverse impact as the project would substantially detract from the overall recreation experience. Decommisioning cannot possibly return the area to its predevelopment conditions." HG.1

Having spent the past 34 summers in the Medicine Lake Highlands and particularly at Medicine Lake I can testify to the beauty, the pristine air quality and the wonderfully quiet evenings and nights there. It is so quiet that you can hear conversations from one side of the lake to the other. If this project is approved these qualities which make this area so special will be ruined. HG.2

Thank you for your consideration.

Very sincerely yours,

Lorin Spencer

Lorin C. Spencer

Letter HH

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

Ve value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please ıbmit any comments at the close of the public hearing or send comments by September 16, 1997) the address listed at the bottom of the page.

'our Name: Lucinda Spencer
.ddress: 3502 Nyland Way
Lafayette, CO 80026
'hone: 303 5435765

:omments: I have been coming to Medicine Lake for 35 years. This area is one of the few pristine areas left in California. Between the amazing geologic history and the ~~[illegible]~~ incredible history of the Modoc Indian's inhabitation ~~[illegible]~~ really create this area to stand out. HH.1

It seems the short term gain of the geothermal development would be significantly less than the overall long term & short term environmental damage done to this area. HH.2

~~This~~ Medicine Lake is my family's "spiritual" gathering place. To consider 3 generations of persons have been gathering, sharing, loving & appreciating for over 35 years. HH.3

Please allow this land to stay untouched & undeveloped! There are other solutions to energy than to tear up this sacred land. It is sacred. HH.4

Thank you.

Sincerely,
Lucinda Spencer

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter HI

Martha Spencer
7020 SE Highway 101
Lincoln City, OR 97367
(541) 994-5732

August 6, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The purpose of this letter is to express my extreme opposition to the geothermal development project proposed near the Medicine Lake recreation area. I support the NO ACTION alternative in the EIR/EIS based on the adverse environmental effects regarding visual resources, air quality, water quality, noise, vegetation, recreation and wildlife resources as listed in the Environmental Analysis. HI.1 HI.2

I have been coming to Medicine Lake every summer for thirty five years, since I was four years old. During this time I learned to value the pristine environment that this area offered; no electricity, dirt roads and no television! I can't express in words the thrill it is to see an eagle sweep down from a tree and catch a fish or a mountain lion saunter across a road or a pine martin play in your "front yard"! All these things I have witnessed and enjoyed at Medicine Lake. HI.3

I have worked for the Forest Service in the Medicine Lake area (at the Big Valley Ranger District, Modoc National Forest) for four seasons, and am very familiar with the fragile ecosystems of the area. I received a Masters of Science in Natural Resource Planning and spent the last 10 years reviewing environmental documents for Siskiyou, Trinity, Humboldt and Glenn Counties (California). In reviewing articles written about the proposed project, it is clear that all of the proposed actions, other than the no alternative action, will cause major adverse effects to the environment, water quality and wildlife of the region. It is also clear that the project is not necessary because there is no need for the power and the cost of the product will not be competitive given today's energy market. HI.4 HI.5

I have always been very supportive of the development of alternative energy sources. I co-taught an Environmental Science at Columbia Basin College (Washington state) for the past 18 months with an emphasis on alternative energy. Geothermal energy was discussed at great length. However, I believe that this energy supply should benefit the users of the area without great environmental destruction. The proposed development does not meet these qualifications. The nearest large urban area is over 350 miles south of the project site. This energy supply will not be developed for the citizens of Siskiyou, Modoc and Shasta Counties! HI.6

Finally, the current recommended site will significantly impact on the quality of the recreation at Medicine Lake which is the use the land should be protected for. The Forest Service has spent significant amounts of public money developing recreation in the Medicine Lake area over the past 20 years (including a boat dock launching area, access roads and campgrounds, and a snowmobile staging area with a large warming hut which cost over $100,000!) . Recreation should be the focus of this area, not energy development. HI.7

While I agree that public lands should be put to multiple uses where appropriate and that we need to pursue clean sources of power wherever environmentally and economically feasible, this proposed project in the pristine Medicine Lake area given the documented adverse impacts and lack of economic benefit, simply MAKES NO SENSE! HI.8 *In short, the No Action Alternative is the only reasonable recommendation at this time.* HI.9

Please put me on your mailing list for all future public decisions regarding this project. HI.10

Sincerely,

Martha Spencer

cc: Vice President Al Gore
Senator Diane Feinstein, California
Senator Barbara Boxer, California
Mr. Bruce Babbitt, Secretary of the Interior

NOV. 3, 1997

RANDALL SHARP, PROJECT LEADER
FOURMILE HILL/TELEPHONE FLAT PROJECTS
U.S. FOREST SERVICE
80 WEST 12TH STREET
ALTURAS, CA 96101

DEAR MR. SHARP:

I OPPOSE AND URGE THE FOREST SERVICE AND BLM TO RESCIND THE PROPOSED FOURMILE HILL AND TELEPHONE FLAT GEOTHERMAL PROJECTS, HJ.1

AS A FORMER CALIFORNIA RESIDENT, I AM FAMILIAR WITH THE REMOTE AND BEAUTIFUL MEDICINE LAKE HIGHLANDS VOLCANIC AREA SOUTH OF LAVA BEDS NATIONAL MONUMENT. THIS AREA'S PRISTINE CHARACTER, OLD-GROWTH FORESTS, WILDLIFE, AND SACRED RELIGIOUS SITES SHOULD NOT BE SACRIFICED FOR THIS COSTLY AND SPECULATIVE SOURCE OF ENERGY. THE PROPOSED PROJECTS WOULD CREATE SUBSTANTIAL CUMULATIVE ADVERSE IMPACTS, AND FRAGMENT THE LANDSCAPE WITH MILES OF TRANSMISSION LINES, PIPELINES, AND ROADS. HJ.2

THANK YOU VERY MUCH FOR YOUR CONSIDERATION,

SINCERELY,

Mr. Richard Spotts
Route 1, Box 66BB
Ashland, WI 54806

Letter HK

To: Mr. Randall Sharp, USFS / BLM

From: Marshall Staunton and Family

Re: Fourmile Hill Geothermal Development Project EIS /EIR Coordinator

Upon review of the Environmental Impact Statement for Fourmile Hill Geothermal Development Project we have decided that we oppose construction of this and subsequent facilities based on the fact that the economic and environmental costs far outweigh the benefits of proceeding with construction. HK.1

My largest concern with the project revolves around the scope and potential for the total immersion of the Glass Mountain Unit Area Leaseholdings into a conglomeration of future geothermal power production sites. The Environmental Impact Statement does not address the fact that Calpine and Cal Energy have in the past shared ownership interest in several geothermal lease holdings. The fact the Calpine would draw up plans for a transmission line with the capacity to carry 5 geothermal power plants of similar design and size demonstrates a clear necessity to consider the total potential development of the Medicine Lake highlands. The fact that Calpine would even propose a transmission line that would cut in front of Glass Mountain, skirt the Northeast shore of Medicine Lake and conveniently connect with the Cal Energy site is galling. HK.2

Throughout the scope of time in which humans have been attracted to Medicine Lake the place has spoken to their hearts and souls. It deserves protection as the treasure that it is in a relatively undeveloped state. There is a major effort to connect Medicine Lake to a Scenic Byway which some have supported. The construction of one power plant and then the subsequent construction of future power plants clashes with our Nation's investment into the area for camping, fishing, hunting, boating, hiking, auto touring, snowmobiling and X-country skiing. HK.3

It saddens me that neither prospective geothermal company has tried to design a total project development on one quadrant of their leaseholdings on the eastside of the caldera with one medium sized facility [instead of the potential for several small facilities surrounding the caldera] and one transmission line directed away from Medicine Lake and Lava Beds National Monument. HK.4

Small rural Western counties are hurting in the wake of a lockup of Natural Resources. However, our environment is important and we should design and develop natural resources wisely. We should allow rural counties the opportunity to sustainably use natural resources without severely damaging the ecosystem we are connected to. This project as proposed does not satisfy that standard. HK.5

Sincerely,
Marshall Staunton and family.
8/30/97

Letter HL

363 W. Bissell Avenue
Richmond CA 94801
September 24, 1997

re: SC No. 96062042

Dear Mr. Sharp:

This letter is to protest the Fourmile Hill Geothermal development. I believe that it is at best unnecessary and evidently an abuse of public resources. HL.1

We do not need any more energy development at this time. Proof of this is found, among other places, in the raising of the speed limit to 65 miles per hour, the relaxing of the fuel economy regulations, and the willingness of Congress to sell of the national oil reserves. I realize that your development is meant to generate electricity rather than oil, but since Congress in its wisdom has determined that we have plenty of oil, we can use that to generate whatever additional electricity is found to be needed. HL.2

In addition to the lack of actual need for this development, there seems to be a substantial give-away of public resources in the plan. Roads through sensitive wildlife habitat and an astonishing amount of water usage would seem to me to negate any value this may have, even if it were necessary. HL.3

I would caution your agency to become increasingly careful of its stewardship of public lands and resources. Your friends are becoming fewer. Thank you for your attention to this matter.

Sincerely,

Barbara Stauss

Letter HM

P.O. Box 1197
Alturas, CA 96101
Sept. 25, 1997

Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

The "Medicine Lake Citizen's for Quality Environment" has asked me to comment on the Forest Service proposed action in the Medicine Lake area.

I am in agreement with the U.S. Forest Service to allow geothermal development in the Medicine Lake area. This project, up to six or more units, will have very little if any effect on wildlife and minimal effect on visual quality. HM.1

I feel that the "Medicine Lake Citizens for Quality Environment" are a bunch of people who have cabins in the area and don't want "their land" to be disturbed and they are being a bunch of NIMBY's. The nation needs more power all the time to supply the country and NIMBY's with the electric power they demand. HM.2

Please proceed with your project. HM.3

Thank you;

Howard I. Stearns

Howard I. Stearns

Letter HN

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please omit any comments at the close of the public hearing or send comments by September 16, 1997 the address listed at the bottom of the page.

ur Name: Don Sterner
ldress: c/o Gen Del,
Mt Shasta, Ca
one: 926-6357

omments: Dear Sir: Please Please let the Geothermal Project Proceed. Geothermal Power is a natural Resource often overlooked the proposed Project is in a remote area. The benefits far out weigh the objections of the few residents of the area I have observed 3 other Geo Thermal Projects and can take no exception to them. HN.1

God gave Man dominion over all the animals and resources of this earth and it is up to man to use those resources wisely. How else could you wisely use Geo thermal power? HN.2

Again, Please don't bribble to the few greedy individuals but proceed as quickly as possible for the completion of this Project for cheap clean power HN.3

Thanking you in advance

Don Sterner

I am a 50 yr resident of Mt Shasta, Calif

you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
Alturas, California 96101

Letter HO

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

: value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please
omit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997
the address listed at the bottom of the page.

ur Name: Victoria Sturgis
ldress: 7470 Seneca Place
La Mesa, Calif 91941
one: _____

omments: It seems a shame money is such a powerful tool in destroying a wonderful camp area. I know it is just a job for you - from here you go to the next one. No looking back at the havoc you have caused. HO.1

I am writing about Medicine Lake area my two sisters, Louise Thompson and Olga Orr have ~~had~~ a cabin there for 30+ years. I have taken my children, grandchildren and now great grandchildren for a vacation from the city - for past 30+ years - What will I tell them when we can not go there because of the rape of the land, Medicine Lake, the forests, and the many animals & birds - large, small - HO.2

In sure if you really combed other areas you would find one with the same or more geothermal power - one that would not destroy this beautiful pristine area of Medicine Lake. HO.3

Why the hurry?
Why not tell what it will really be like when you finish.
Is that what happened at Salton Sea? and is causing its demise? HO.4

-you wish, you can mail your comments to:
fr. Randall Sharp
!SFS/BLM
ourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
lturas, California 96101

Letter HP

John R Swanson
3400 Edmund Blvd
neapolis, MN 55406-2942

4 September 1997

Modoc National Forest
800 West 12th Street
Alturas, California 96101.

Dear Sirs:

Please accept my following comments concerning the Powerlines and Geothermal Powerplants, Medicine Lake Highlands.

Do oppose powerlines and geothermal powerplants in the Medicine Lake Highlands area. HP.1

As such development will destroy soil, water, air, wildlife, fish, plant, recreation, scenic-visual, and roadless-wilderness resources.

May I suggest that this area be managed as a Wildlife Fish Plant Habitat Sanctuary and with no development activities. HP.2

So save all old-growth, and include in a National Old Growth Preservation System.

And to designate the Mount Hoffman/Blass Mountain Wilderness of 16,000 acres. HP.3

With the establishment of the Medicine Lake National Monument of 61,000 acres, and the designation of the Medicine Lake National Monument Wilderness of 52,000 acres. HP.4

So fully preserve the Native American cultural areas in this region. And to save the area from air and water pollution as well as to save all Roadless Areas. HP.5

Sincerely,
John R. Swanson

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Donald S. Teague
Address: 11106 Apache Rd.,
Montague, CA 96064
Phone:

Comments: We have no use for the proposed geothermal development in the Medicine Lake Highlands. This is a very important recreation and natural area and is enjoyed by many people, and should remain so. HQ.1

The proposed development is on government land, OUR LAND. The Forest Service and the Bureau of Land Management are paid by us, the taxpayer, to protect OUR land. They must not stab us in the back and allow this beautiful property to be destroyed for greed. The proposed development will benefit very few, the rest of us will never realize any benefit from it. But many benefit from the camping, fishing, hiking, hunting and snowmobiling that the area now provides. HQ.2

Please do not allow this costly, anti-environment project to be built and destroy all this very beautiful and important recreation area. Too much of this type of destruction is already taking place. We do not want any more. HQ.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Annabel J. Teberg, M.D.
1894 North Euclid Ave.
Upland, CA 91786
(909) 982-7561

August 2, 1997

Mr. Randall Sharp
USFS/BLM Fourmile Hill and Telephone Flat
Geothermal Development Project EIS/EIR Coordinator
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp:

It is with deep concern that I write to you regarding the proposed geothermal power plant project located in the Modoc National Forest.

Our family has had a tiny, primitive cabin at Medicine Lake for the past thirty five years. During this time we have all come to dearly love and greatly appreciate the unspoiled and natural beauty of the area, and have felt so privileged to be part of the surroundings. Having lived in Southern California east of Los Angeles, we have witnessed the desecration of our beautiful land over the past 45 years. We have felt so fortunate to be a part of, if only for a few short weeks during the summer, the unchanged and protected natural area of the Medicine Lake Highlands. HR.1

We have welcomed each year the nesting pair of bald eagles, the osprey, blue heron, double crested cormorant and many warblers that migrate through the Medicine Lake area during the summer months. Our children have witnessed the beauty of the mule deer, black bear and mountain lion. From this childhood influence, all of our six children have learned to appreciate the beauty and fragility of nature and how it must be protected from those who would destroy it. Two of our children have geology degrees and work toward understanding and preserving our environment. All six cherish their world and understand the value of protecting their environment.

I have read the proposal for the development of geothermal power which will include wells, well pads, roads and interconnected geothermal fluid pipelines in the Fourmile Hill area which is only three (!) miles northwest of Medicine Lake. I have reviewed the proposed route and am frankly astonished that such a proposal so close to the lake was even considered! I am very aware of the damage to the forest that any such proposal would accomplish, but to carry out such a plan so close to the lake, a valuable recreation area, will result in deforestation, noise, and air pollution is unthinkable. HR.2

We have so few pristine treasures left in California that each one must be protected for future generations. Please adopt only the "No Project" alternative and protect not only our forest ecosystems but the fragile wildlife of the area. Stop this project-the damage done will far outweigh any economic benefits which will result. HR.3

Sincerely yours,

Annabel J. Teberg, M.D.
aka Mrs. Lorin Spencer

cc: Vice President Al Gore
Mr. Bruce Babbitt, Secretary of the Interior
Senator Diane Feinstein, California
Senator Barbara Boxer, California

Letter HS

1069 Felicia Ct.
Livermore CA, 94550
510 455 9473
Sept. 16, 1997

Randall Sharp, Project Leader
Re: Fourmile Hill/Telephone Flat Projects
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp,

I am writing to express my strong opposition to the proposed geothermal projects envisioned by CalEnergy and CalPine for the Medicine Lake Highlands area of the Modoc National Forest. HS.1 California does not need further loss of animal and bird habitat in these oldgrowth forests. We do not need more roads and clear-cutting in our national forests, more blight from power lines, and invasion of areas sacred to Native Americans (and other Americans too). HS.2 This project would be especially unnecessary since the power generated would apparently be sold to Oregon. HS.3

I urge you to work to protect our valuable natural resources and biodiversity in the Medicine Lake Highlands by opposing this project. With our incredibly expanding population problem in California, we need to protect as much land as possible from development. These lands are part of the natural heritage of all Americans and should not compromised. HS.4

I swam once in Medicine lake. It is a day I will never forget as a wonderful venture to be remembered the rest of my life.

I hope that you will adopt a firm position in favor of the many birds and animals that call this area their home.

Larry Thompson

Aug 30 1997
Louie Thompson

Letter HT

I read the EIS*EIR report and here are some of my observations.

We should consider the entire Medicine Lake area and not just the well pads and transmission lines. It is a unit as a whole - surface and sub-surface, air, water, and atmosphere. **HT.1**

The public has been alerted to the status of endangered species all over the world. Shouldn't the developers of our natural resources have to be concerned with protecting threatened species? Case in point:
In the EIS Project book, in Section 3.8, are listed 22 birds, including 8 bats and 6 mammals who frequent this area. I have personally seen most of the creatures on this list. Forest stands with late successional characteristics such as high canopy closure and large tree diameter provide favorable habitat for these species. Special habitat features such as lava flows, cliffs, caves, rock outcrops, large defective trees, and large snags are important for many wildlife species. All of these features abound in the area proposed for power plant construction and in the transmission line corridoe. **HT.2**

We all object to the spoiling if the South American rainforests and the So.East Asian lands. Should we then do the same thing in our area to satisfy the interests of the big money crowd? 22 birds and 6 mammals existing in this area are listed on the Federal and State Endangered & threatened species and also on the California Species of Special Concern whose future is in doubt due to habitat destruction. Since birds and deer can't talk, we'll have to speak up for them. Eagles, goshawks & ospreys are known t o have nests adjacent to Medicine Lake which is suitable foraging habitat for them. How long will they stay when the air becomes polluted with hydrogen sulfide and sulphur dioxide? We're told not to worry because we can't smell it, but it's still there and affects the environment. **HT.3**

How is the land use affected by this development? In Sction 3.11, the Recreational use of Medicine Lake id detailed. 75 improved cmapgraound sites plus a large day use picnic area and boat launch ramp. An estimated 40,000 recreationalists visit this area each year. Use has increased by 8 t0 10% per year over the past 3 years. During the week, campgrounds have 65% occupacy, on weekends, 100%. Visitors predominate from Chico north & So. Oregon. The government, both state & Federal, has used public money to construct and maintain this recreational camping & boating site. This will be diminished by tampering with the environment by well & transmission line construction. No longer will it be a pristine area, the closest to wilderness that most city dwellers experience. **HT.4**

snowmobiling as a sport has shown an increase in the past few years. Usually 200 to 250 visitors frequent Medicine Lake on holiday weekends in winter, an increase of 20 to 25% per year over the past 3 years. Visual pollution by the actual power plant and transmission towers will impact on the wilderness feeling of this area.in winter. **HT.5**

Many visitors to the Lava Beds Nat, Monument drive up to Medicine Lake as part of their visit. Use of the Monument's wilderness area is about 8000 visits per month during the summer season with a 3 to 5% yearly increase in general visitation over the past 3 years. **HT.6**

A new industry has developed in the Medicine Lake Highlands ; mushroom harvesting from September to December. In 1994, no permits were issued, increasing dramatically to 865 permits in 1996 issued by the Goosenest Ranger Station. The Matsutake Pine Mushroom has great commercial value, especially in Japan. Suitable habitat and sources of the Matsutake mushroom abound in the area of the power plant, well field & transmission line.If ground is disturbed, the continuation of the mushroom harvest will be affected & possibly ruined forever. A million dollar business will have been lost. **HT.7**

Another reason I object to this project is that there are so many unknowns. How much air pollution eill occur over the lake? What disturbance will there be in this area of underground lava tubes and hot areas such as the HOT Spot? Will the Lake level and aquafir fall due to massive water well use during drilling & maintainance? How will cabin area be policed during winter & spring months when cabin ownwers are absent But the additional roads and snowplowing will allow widespread travel by outsiders - could result in vandalism. **HT.8 HT.9 HT.10 HT.11**
Several places in the EIS notes that there is insufficient data to evaluate the effects on the environment; further drilling & reservoir testing must first be completed.
In Sec. 4.4, the capacity of the KgRA was made with very limited data and is probably an overestimate of the resource potential that can be economically developed The amount of electricity produced by the proposed project is subject to confirmation drilling and amy be less than 49.9 MW. What about accidents & spills of hazardous materials & geothermal fluids **HT.12 HT.13**

Relating to Indian Artifacts (Sec 4.6), if any are found, a 100' distance will be kept free of drilling & construction. Will this be enough to protect Indian sites? American Indian cosultants say the project will have a significant adverse affect aon the spirituality of the Medicine Lake Highlands 26 Indian cultural sites have been identified, kept confidential to keep tourists away. Local tribes do not consider effects according to specific sites but rather on the whole Medicine Lake Highlands region. Medicine Lake & Timber Mountain are part of a whole integrated landscape which will be significantly affected by the development. Table 4.61, of 26 sites listed by tribal members, 11 sites list visibility of steam plumes from the power plant, 3 list visibility of power plant lights. If visible on tribal sites, it stands to reason that they will be visible from campgrounds & cabin sites.
The Project would introduce industrial elements into the forest landscape thus disturbing the pristine quality of the environment. The defined mitigation may not fully mitigate the effect; the impact would therefore be considered a significant unavoidable impact. **HT.14 HT.15 HT.16**

Visual Quality (Sec. 4.9)
Lighting will be along the full length of drill rig masts, 140 to 145 feet tall, operated on a 24 hour basis. Steam plumes will be more visible on cold days as they are related to ambient temperature. Dry days have high evaporation rates. Cold day plumes are more dense and this more visible. During 1st 2 Years of construction, well venting will occur for 2 to 6 weeks, plumes range between 40 t 285 feet. Cooling tower steam plumes will occur during plant operation extending from 110' in heigth & 375' in length, visible year round. In winter 250' high, 930' long. **HT.17**

Visual quality impacts that can not be mitigated involve changes of landscape made by transmission line as seen from the Lake, campgrounds & private residences. Heavy equipment & construction vehicles as well as heliopters will operate for the 3 years of construction. After decommissioning, it will take 50 to 75 years to restore forest conditions. **HT.18**

The permanent new source of night lighting will create a strong visual contrast with night time conditions in the area and have a significant visual impact. **HT.19**
In Sec. 4.11 it is stated that visitors planning to stay in the Medicine Lake area who are bothered by the plant noise can move out of the area ormake a decision not to hike or hunt in proximity of such activities. What about the 40 or 50 cabin owners - they cant move on to a new site. **HT.20**

In conclusion, Option 7, the No Action alternative is what I favor.
Do not allow big money developers to ruin this beautiful area. **HT.21**

4235 W. Scenic Dr.
Mt Shasta Ca
96067

Letter HU

Diane Henderson-Bramlette

Dear Diane,

Spt. 19, 1997

I would like to call your attention to the Geo-thermal development planned for the Medicine Lake highlands area of Northern California. It is being protested by many of the residents of Siskiyou County as being detrimental to the recreational use in this area. This pristine area provides a stark contrast to many of the other recreational areas in California, overrun by tourists and development. HU.1

Unfortunately, the cumulative effects of all potential geothermal development within thw Medicine Lake Highlands have not been analyzed as required by NEPA & CEQA. The USFS & BLM are piecemealing in One power plant at a time while the transmission line being built has the potential to carry the output of 6 power plants. HU.2 The noise, air and water pollution of this pristine area-the closest to wilderness that most people will ever see - is unacceptable. HU.3 This area belongs to the people, not to the big money interests. Let's stop the development before it's lost to us forever. HU.4

Please use your influence to stop this development.

I attended 3 public comment meetings with FS/BLM personnel and was constantly told in answer to my questions to " read the EIS". I analyzed the EIS-EIR Report and enclose my comments on it. HU.5

Sincerely yours,

Louise Thompson

Louise Thompson
1235 W. Scenic Dr.
Mount Shasta, CA 96067

This whole development is unconscionable + immoral to destroy a recreation environment for the sake of the big money interests. Please help us.

Louise Thompson HU.6

Letter HV

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please bmit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997 the address listed at the bottom of the page.

ɔur Name: LOUISE THOMPSON
ddress: 1235 W. Scenic Dr.
Mt Shasta, Ca 96067
ıone: (916) 926-2381

ɔmments: Dear Randall -

I have been to 3 of your meetings + asked questions which you did not answer but repeatedly said - "Read the EIS". I have read it + hereby submit comments on 3 of 4 alternatives. If I commented on all of it, it would run to your 5 page of clearly legal material. HV.1

The Forest Service in its multiple use plans have designated the Medicine Lake area as a Recreation Area. Why the hell are you planning to demolish it for the use of a geothermal plant which will only last 40 years. If left alone, it will be used forever by our children + grandchildren. HV.2

I advocate Option 7 - the No Action Alternative. HV.3

Thank you.

Louise Thompson

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
300 W. 12th Street
Alturas, California 96101

Letter HW

945 Matadero Ave.
Palo Alto, Ca. 94306
September 14, 1997

Randall Sharp, Project Leader
RE: Fourmile Hill, Telephone Flat Projects
Modoc National Forest
800 West 12th St.
Alturas, Ca. 96101

Dear Mr. Sharp –

I'm opposed to both the Cal Energy and Cal Pine geothermal projects. HW.1

My husband and I have camped in the area & love it dearly: there is no other place like it. The Medicine Lake Highlands deserve National Monument status. Its old-growth forests, birds, & animals & plants must be protected HW.2

Please do not permit the terrible damage these projects would inflict: visual blight, habitat loss, infringement on religious practices of Native Americans. Thanks for making the right decision. HW.3

Sincerely yours,
Joyce T. Todd

Letter HX

Randall Sharp
USFS/BLM
800 W. 12th St.
Alturas, CA 96101

P.O. 815
Aromas, CA
95004
408-726-1937

Dear Mr. Sharp,

My husband and I are opposed to the Four Mile Hill and the Telephone Flat projects. For several years now, we have been making payments on an old fixer-upper and property in rural Modoc County. We intend to retire there when we can afford to. Therefore, we are appalled when we read that our pristine wilderness areas are threatened by such objectionable development as geothermal wells, pipelines and substations. HX.1

Medicine Lake and its surroundings are one of our favorite places to visit, to take children and friends, and to photograph. It seems criminal to consider detracting from such beautiful, unspoiled areas, which otherwise could go on giving pleasure to millions of visitors on down the ages. As a matter of fact, the last time we were at Lava Beds National Monument, we heard and saw many foreigners who were tourists there. Surely Medicine Lake is a national treasure, which we must not spoil, simply to get further tax revenue and a measly 19 jobs! HX.2

When we chose Modoc County as our retirement spot, we wanted to get away from the voracious development that we see in central coast California, and all the plagues of over-population. We assumed (perhaps foolishly) that the evils of population density and a high tech society would not pursue us there. But every few months we read of another threatened encroachment on that precious haven of north-eastern California.

I know that the USFS and the BLM will do what you can to help prevent this unnecessary development of one of the most magnificent & natural places on earth. HX.3

Sincerely,
Elizabeth R. Tozier
Elizabeth R. Tozier

Letter HY

Alice Tseng
6801 Trojan Ct.
Moorpark, CA 93021-2550
Sept. 29, 1997

Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development
Project EIS/EIR Coordinator
800 W. 12th Street
Altruras, CA 96101

Dear Mr. Sharp,

Pursuant to receiving the DEIS/EIR dated July 1997, after a **brief and preliminary** review on selected segments of this "convoluted" document, not only that I request for **an extension of the review period to the end of this year**, but I personally decided to go **against** the project because I found the following, **and not limited to**, discrepancies and deficiencies in addressing the various impacts resulted from the Fourmile Hill Geothermal Project: HY.1

1. Introduction and Purpose and Need:

The inferences in this chapter doesn't clearly substantiate the "needs" for the region to initiate such project. On page 1-3 it states that "in the face of regional growth and increasing constraints on the existing energy resoucrs base, BPA needs to acquire resouces that would contribute to.....," but there is no actual growth statistics and descriptions of current and existing energy demand/sources supplied to justify BPA's conclusion. As a taxpayer, I question the socioeconomics of this project, as many others have in the past stated on page 1-21. I did not find any explanation on the funding or on the cost analysis performed for this project. Furthermore, as stated on page S-11, "Population in the project area is low and includes the community of Tionesta and scattered residences. Other local communities in the vicinity f the project includes Alturas, Dorris, Dunsmuir, Etna, Fort Jones, Montague, Mount Shasta, Tuleake, Weed, and Yreka. Tha majority of local housing and some jobs occur in these communities.Employment in the region relates to timber, agriculture, recreation, mining, trade and service, and more recently development and construciton." It is extremely unclear to me as who would be the people benefitted from this project? The HY.2 HY.3

disrepancy and deficiency are huge here in the purpose and need of the Fourmile Hill Geothermal Project.

The estimated 24-mile of the proposed transmission line, which extends "in an easterly direction from the proposed power plant site through the Modoc NF to a proposed substation along the BPA Malin-Warner transmission line (which parallels Hwy 139 near Perez, CA.," as stated on p1-3, actual crosses the CA-OR border, is there any sharing of energy and economic benefits between CA and Oregon from this project? It was not stated in Chapter one overview, this I found very deficient in the economic framework of this project. HY.4

On page 1-4, it states that "BPA has the following agency purposes or objectives: test the ability of geothermal energy in the Fourmiole Hill area to provide a reliable, economical, and environmentally acceptable energy resources in the region;.....," from there, if one refers to Chapter 3: Description of the Affected Environment, in which certain aspects of the geology, soils, hydrology and geothermal resouces are discussed, one began to realize that this is indeed, at this stage, an **exploratory project,** no guarantee at all as far as the proposed gross 49.9 MW geothermal power can be harnessed from the Fourmile Hill Project. This is most disturbing, especially when one thinks of all the large-scale incurred environmental damages associated with this **exploration**. The current scientific exploration is very deficient. I vote 200% for the "no project" alternative till more very small-scale, scientifically-based investigations, with minimal environmental damgaes, are conducted to ascertain the likelihood of the extraction of 49.9 MW geothermal power. And I am sure that since we live in the technology-advanced society, such small-scale investigations are technologically-feasible and certainly economically feasible, before the full-scale launch of the project happens. HY.5

3. Description of the Affected Environment:

It is clear in my mind that the BPA is too uncertain about the impact on the environment, for instance, as it describes the regional groundwater flow directions from Medicine Lake /Medicine Lake Caldera to vicinity. In the various descriptions of the affected environement, there are too numerous assumptions allowed and statements including **"probably" and "likely."** On page 3-26 and 3-27, it was stated that "It is likely that a portion of the groundwater recharge area for the Fall River springs includes much of the south flank of the Medicine Lake volcano. An uninterrupted downhill slope, almost entirely underlain by young, permeable lava flows,....." and "It is probable that groundwater feeding the Fall River springs has moved HY.6

only in the very shallow subsurface with probably relatively short residence times.....", this particularly instill a lack of confidence in me on BPA's work and it only further accentuates the need, in my mind, for BPA to employ more small-scale investigations to ascertain the probability of the region providing the proposed power, in an environmentally-sound manner. This deficiency desparately needs to be addressed! Scientifically!

I wished that the BPA was more descriptive detailing the mitigation and monitoring of various sites for water quality. And which sites are selected so the Central Water District can monitor? What is the mitigation in case of leaks of contaminated water to long distances from Medicine Lake, say from seismic activities? **Clean Water Act!!!** HY.7

In your Table 3.3-3:Surface Water Uses on page 3-28, Medicine Lake , Crystal Springs Creek, Little Medicine Lake, Bullseye Lake, Paynes Creek, Blanche Lake, and Schonchin Spring are listed as Fish Habitat, yet there is no mention of the species of fish found in these habitats. If I was to go to 5:Mitigation Mointoring and Reporting Program, again no names of the species of fish found in these habitats are listed, how do you suppose mitigation can be measured without knowing which species of fish are being mitigated for? I urgently request that the list of fish inhabiting these waterbodies to be included and studied in the DEIR. Without it, the DEIR cannot be considered half-way complete, and **we have a right to know!!! Endangered Species Act!!!!** HY.8

On page 3-214, Table 3.16-3: Sources of Public Finance in 1995-1996 didn't show one ounce of evidence of economic benefits of this project for the local communities. Again, there has to be returns on public finance to show that what you stated in your purpose and needs are indeed true. Otherwise this project is just another way of digging a black hole into the taxpayers' pockets. HY.9

In summary, after a **brief and preliminary** review on chapters 1 &3 of this "convoluted" document, not only that I request **for an extension of the review period to the end of this year**, so I can pour over in greater details the technical portions of this project, but I personally am **against** the project because the discrepancies and deficiencies found, just in chapters 1 & 3, in addressing the various impacts resulted from the Fourmile Hill Geothermal Project. HY.10

Sincerely Yours,

Alice Tseng
Member of Los Padres
Chaper, Sierra Club

CC: Andrew Verdi
200 Mayhew Way
Walnut Creek, CA 94596

Dominic Perello
1591 Slack St.
San Luis Obispo, CA 93405-1963

Letter HZ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Mr. & Mrs. Richard Turner
Address: 7252 Whitehouse Dr. #8
Anderson, CA 96007
Phone: 916-246-2475

Comments: We strongly oppose the Fourmile Hill Geothermal Project. If there is something we really don't need in California it is another Geothermal Plant. The power isn't needed. It is a total waste of money. The thought of putting such a plant in this beautiful area is abhorrent. If there were a shortage of power it would be one thing, but to ruin the beauty of this area for the sake of big business is unconscionable. HZ.1 HZ.2 HZ.3

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IA

9/11/97

Dear Mr. Sharp,

I have reviewed the Fourmile Hill Geothermal Development Project EIS draft.

I find no proposed alternatives that will not interfere with the recreation values my family enjoys in the Medicine Lake highlands. IA.1

Furthermore, the power and profits generated will be funnelled out of Siskiyou and Modoc Counties. IA.2

I urge you to adopt the "No Action" Alternative 7. IA.3

Thank You.

Sincerely,
Susan Turney
Citizen, Photographer

September 26, 1997

Mr. Randall Sharp:

Please excuse the handwritten comments on the Calpine Fourmile Hill Draft EIS/EIR. I only recently learned of this project and received the Draft EIS/EIR and now must write these comments hurriedly while traveling. IB.1

This project must never be implemented as proposed. The only acceptable decision will be to choose the no-action alternative. // I'm not sure at this point that you have correctly identified all significant impacts associated with the proposed alternative, but the ~~many~~ many you have identified would far outweigh any conceivable benefits of this project (which appear to me to be limited to filling the bank accounts of Calpine executives). IB.2

Most upsetting of all, is to learn that in 1997 the USFS would advocate such a blatant disregard for the rights of Native Americans. It appears that the ghost of Custer has arisen in the offices of the Modoc National Forest. Will the Medicine Lake Highlands become the Black Hills of the twentieth century? Do you remember what happened with the G-O Road? Shame on all of you. IB.3

Aside from Native American values, the Medicine Lake Highlands have many other values: geologic, pedologic, wildlife, and recreation most importantly. As a magnificent example of an active basaltic, shield volcano and a living laboratory of recent soil formation as well as other reasons, the area as a whole is deserving of consideration for National Monument status. // IB.4

The fragmentation of the area into 3 National Forests and numerous management units has prevented full recognition of the values of the area as whole, as is evident in your Draft EIR/EIS. At the very least, the Medicine Lake Highlands must not be turned into an industrial zone, for the profit of a few. // The Draft EIR/EIS does refer to a forthcoming Calenergy Telephone Flat proposal, but it appears that many more geothermal development proposals may be forthcoming in the future, and the cumulative impacts of these future proposals have not been evaluated in the Draft EIR/EIS. IB.5 IB.6

I believe that alternatives for siting the power plants and other facilities could have made a minimally acceptable project. These alternatives were dismissed in your Draft EIR/EIS in arguments without merit. I would suggest, for example, that the power plants could have been sited outside or below the 5000-foot contour, with either horizontally drilled IB.7

wells or extended pipelines. In response to the argument that cost would be prohibitive, I would say that if Calpine cannot accept the cost of the environmental impacts of their proposed projects, then they should not be in the geothermal business.

I wish to be kept informed of all future developments related to the Calpine Fourmile Hill project and any other proposed geothermal development in the Medicine Lake Highlands. Specifically, I wish to be added to the mailing list to receive the Calenergy Telephone Flat Draft EIR/EIS, when that document becomes available. IB.8

Wayne Verrill
1621 Eligio Lane
Davis, CA 95616

Letter IC

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~[illegible]~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Sharon E Villarreal
Address: P.O. Box # 261
Burney, Calif. 96013
Phone: (916) 335-3579

Comments: I really oppose of this Geo-Thermal plant because i seen the impact already with the Sumps, and wells, up there. Now i can imagine what more from hearing from one of your sources that this Geo-Thermal is going to be real huge. IC.1
You cannot tell me there is going to be safely controlled ~~and~~ atmosphere up there, and scenic view free of the plant. IC.2
I happen to know that there is going to be devastation to the Wildlife, and plants. (From this Geo Thermo plant) and i am trying my best to see if we can find another solution with this problem with the plant. IC.3
Thank You
Sincerely Alternate, and Cultural Representative for the Ajumawi Band.
Sharon Villarreal

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter ID

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September ~~16~~ 30, 1997 to the address listed at the bottom of the page.

Your Name: Raquel Walters ABTUGEWI
Address: PO Box 162
Burney CA 96013
Phone: (916) 335-7138

Comments: I feel that the geothermal project devastates the natural surroundings and endangers the wildlife that encompasses the area. After the project is finished the ugly piping are left behind, along with the poisonous pools of nouns goo. Do we really need all of this? Is it seriously needed? We need to start looking at the effects long term on the land, not for the project if we don't have people, what good is the project going to do?

ID.1

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IE

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Alyse Waring
Address: 193 E. Division St.
Weed, CA 96094
(916) 938-1105
Phone:

Comments: I think the attached letters say it
Better than I ever could!
Alyse Waring

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Attn: Sportsmen

Dear Editor,

If the USFS and BLM are allowed to proceed with the proposed Geothermal Projects in the Medicine Lake Highlands Area, another great outdoor recreational area will be destroyed.

The powers to be can not guarantee there will be an adverse effects on Medicine Lake. The effects could include pollutants falling into the lake and surrounding area. The poor water quality will jeopardize the fish and insect habitat. The next possible problem could be lake draw down. The construction of "just" the Fourmile Hill Plant will consume over 23 million gallons of subsurface water.

The proposed Fourmile Hill and Telephone Flat plants and associated pipelines, will carry "NO HUNTING" signs. Siskiyou County does not need more closed public lands. Remember these are our lands we are talking about.

Along with Fourmile Hill and Telephone Flat sites, Mt. Hoffman is also being considered. Where will it stop? Do your part and send in your Comment Sheets located on page 8 of this paper.

Jim Shott

Where are you?

Dear Editor,

Concerned people of Siskiyou County, where are you? Have you heard about the proposed geothermal development in Medicine Lake Highlands? They are not talking about two proposed power plants — but six or more. IE.1

Medicine lake is a natural, unspoiled lake located in a volcanic caldera at 6,700' elevation. What will become of pristine Medicine Lake and the surrounding environment if these huge geothermal projects are built. This is a year recreation area. IE.5 IE.6

Medicine Lake has a historic Native American heritage dating back thousands of years. The numerous adverse environmental impacts of this geothermal development will not be so easily or quickly remedied. The cost effectiveness of these projects is questionable. The environmental and ecological costs are not. These developments will be extremely costly to the Medicine Lake Highlands, and to the people and wildlife living in and using the area. IE.2 IE.7 IE.8

The location of these projects are on "our" land. The Forest Service and the Bureau of Land Management are paid by "us" to protect our lands. Instead, the USFS and the BLM will allow our property to be desecrated for the "almighty dollar."

What if this was happening to Mt. Shasta? Would you speak up then? Anyone who has enjoyed or who is concerned about this beautiful untouched area please help save her before it's too late. I feel that if Medicine Lake Highlands could speak, she would beg you to protect her environment and wildlife. I ask for your help in protecting the beauty of this pristine and unique area.

See comment sheet on page 8. Please send your comments by Sept. 16th to Mr. Randall Sharp, USFS/BLM, Fourmile Hill Geother-

Geothermal Baloney

Dear Editor,

Last night I went to the Medicine Lake Geothermal meeting in Yreka and came away with such a head of steam I was producing 49 megawatts. They don't even have to build the plant, just plug into me.

I've never heard such evasiveness, half truths, and I don't knows. Worse still, the answer to every fifth question was "It's in the book." Well friends, the book, EIR/EIS is about approximately six inches thick and you have to be either a lawyer, hydrologist, air quality engineer, or forest manager to understand it.

Let's put aside the smell, the noise, the disruption to wild life or intrusion into Native American spiritual areas. There is still no buyer yet for the electricity. It could go to Oregon, Montana or New Mexico and not even benefit the energy needs of California. IE.3

But hang on folks, that's not all: the transmission lines, which could possibly go between Medicine Lake and the Glass Flow, will have the ability to carry 300 megawatts of power. Now the plant will only produce 49 megawatts and you and I both know they will want to transmit on those lines at capacity, which means - 5 more plants. IE.4

And for all this Cal Pine considers this as an experiment. Gets them off the hook for owning up to the real intentions are.

Why not build 1 plant that produces 300 megawatts you say? Simple. Anything over 650 megawatts falls into another category with more restrictions as to permits, licensing, energy commission hearings and EIR assessments.

So let's all tell BLM and the Forest Service to get back to its original purpose; that of caring for our forests, rivers and wild life instead of selling our heritage.

Marcia Barrow

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: A. JONATHAN WEBB
Address: PO. BOX 706, 712 MILL ST
MT. SHASTA, CA 96067-0706
Phone: 916/926-2889

Comments: I'M VERY CONCERNED ABOUT THE IMPACTS THAT THE PROPOSED GEOTHERMAL PROJECT WILL HAVE ON THE MEDICINE LAKE AREA.

I AM A RESIDENT OF SISKIYOU COUNTY AND I ENJOY VISITING THE LAKE AND SURROUNDING WILDERNESS. I APPRECIATE THE PRISTINE QUALITY OF THE AREA FOR CAMPING AND HIKING AND FISHING. THE UNTOUCHED BEAUTY AND SERENITY OF THIS PRICELESS AREA MAKE IT WORTHY OF SPECIAL ATTENTION. IF.1

I'M WORRIED THAT THE DISRUPTION AND DESTRUCTION THE GEOTHERMAL PROJECT WILL BRING TO MEDICINE LAKE HIGHLANDS WILL FAR OUTWEIGH THE POWER IT MIGHT PRODUCE. IT'S JUST NOT WORTH THE RISK TO THE ENVIRONMENT.

SINCERELY,
A. Jonathan Webb
8/20/97

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IG

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Debbie S. Webb
Address: P.O. Box 706 / 712 Mill St.
Mt. Shasta, Ca 96067
Phone: (916) 926-2889

8-21-97

Comments: I would like to express my concern about the proposed geothermal project. I don't believe that any benefits we would see from this project could possibly offset the damage the construction and operation of it would bring to the Medicine Lake Highlands. IG.1
I don't want to see this wonderful area be cluttered and dotted with powerlines and machinery. Why take the risk of hurting this beautiful and unique wilderness? It's simply unconscionable to let it happen!

Sincerely,
Debbie S. Webb

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IH

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Jerry + Vicky Weber
Address: 3765 Summit Dr
Mt Shasta Ca
Phone: 926-1835

Comments: We feel it's unfair for big business and government to take land and destroy it when we the people have had to protect it all these years. No logging is allowed, no 4 wheeling but when the forestry dept. and BLM need money, they roll over for big business. IH.1
The smell and the noise will be horrible, the whole environment will change. The animals, insects and old trees will go. Isn't this what we've been protecting all these years but now it's OK. IH.2
You people are messing with Mother Nature, and with all your knowledge and degrees, you've heard the saying "Don't mess with Mother Nature!" IH.3
If Oregon needs the power so bad build it in there back yard!! We don't want it here! IH.4

Jerry + Vicky Weber

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter II

6324 Shasta Way
Klamath Falls, Or. 97601
September 19, 1997

Randall Sharp, Project Coordinator
USFS/BLM
800 W. 12th Street
Alturas, CA 96101

Dear Sir:

In regard to the Four Mile Hill and Telephone Flat Geothermal Projects within the Medicine Lake Highlands. I am a Homeowner at Medicine Lake and very concerned about the effects of the Projects upon the Medicine Lake area.

I don't feel enough study has been made by the USFS/BLM AT this time on the effects of the Power Plants and the potential Geothermal development within the Medicine Lake area. If one Power Plant is built, in a short time there will be several. II.1

Please don't ruin the peace and quiet we now have at the Lake. We go up there for a chance to rest and relax. II.2

Yours Truly,
Vivian Wells
Vivian Wells

Letter IJ

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 16, 1997 to the address listed at the bottom of the page.

Your Name: Mary Jo Wheeler
Address: 1201 2ND St #3
NOVATO CA 94945
Phone: 415) 898 2337

Comments: I am ADAMANTY opposed to this "project" IJ.1
The Medicine Lake & surrounding area is one of the few precious pristine oases (OASES) left in our world. To use it for this geothermal project would be a sacrilege! This land belongs to We the People & We are speaking! And so is the Land! IJ.2
This project is NOT necessary nor is it cost-effective. The cost to the environment is too high a price to pay! Please stop this before it is too late. IJ.3
Manage the Land - not desecrate it IJ.4

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IK

HOWARD J. WHITAKER
2041 Campton Circle
Gold River, CA 95670-8301

21 August 1997

Mr. Randall Sharp
Project Leader
Fourmile Hill/Telephone Flat Projects
U.S. Forest Service
800 West 12th Street
Alturas, CA 96101

Dear Mr. Sharp,

The Fourmile Hill and Telephone Flat geothermal projects should not be pursued. The cost effectiveness is questionable, and the environmental and ecological costs are exorbitant. IK.1

The USFS should be managing those lands for the public good and conservation of the area's resources, not for the profits of the developers. IK.2

Sincerely,

Letter IL

Claudia M. Whitnah
951 Ultinian Way
Martinez, California
94553

Sept. 14, 1997

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

Re: Fourmile Hill / Telephone Flat Projects

I am writing to urge you to protect the Medicine Lake Highlands. The area deserves national monument status to protect its wild character. IL.1

Until that happens, in the meantime, Medicine Lake Highlands should be protected from geothermal drilling & degradation. IL.2

Thank you for your consideration.

Sincerely,

Claudia Whitnah

Sept. 29, 1997

Randall Sharp
Fourmile Hill GeoThermal Project
EIS/EIR

The cumulative impacts of the Fourmile Hill, Telephone Flat and projected Mt Hoffman geothermal projects, and any other existing leases in the Highlands must be addressed in any complete EIS/EIR. IM.1

When I became aware of the extensive disruption to the environment of even one of these industrial plants I was surprised that the BLM/Forest Service would seriously consider locating even one in a unique recreational area. It is a conflict with existing uses. Even the best planned, minimum impact project would be out of place in the Medicine Lake Highlands. IM.2

These proposed projects are so controversial that the BPA should consider the negative publicity that would follow purchase of the expensive power produced at this location. IM.3

The Medicine Lake Homeowners Assc., the Native American Coalition and an increasingly informed public in Siskiyou County reject the projects as beneficial in the long run to their well-being and quality of life. This public includes realtors, sportsmen, snowmobilers, doctors, businessmen relying on the recreational potential of our area, as well as those acutely aware of the need to protect a unique geological, sensitive natural environment. IM.4

This is not an "environmentally-friendly" way to produce power located where it degrades recreational use in a recreationally-based economy, reduces land values, affects Native American cultural sites; reduces wildlife habitat for many species including goshawks, martens and fishers in a Late Successional Reserve, and disrupts a critical biological link between the Modoc Plateau and the Cascade Mountains. IM.5

Once started the pressure to maximize the geothermal potential to the limit of what the 21 mile transmission line could carry would increase. Other lease holders would find it increasingly IM.6

attractive. If the line could accomodate six 48MW plants and they were built the whole area would be devastated, cut up with pipelines, lighted towers, vapor plumes, concrete pads, wells, drilling deposit ponds, fences, firebreaks, transmission lines and roads.

Since the present EIS/EIR finds less than significant impacts on water and air quality and species habitat reduction, and suggests people can recreate elsewhere if they are bothered (Sec. 4.11) it leads me to question what impacts would be significant and unacceptable. How much noise of well drilling for up to three years for each 48MW plant would be unacceptable? Is ten or twenty years of construction for six projects likely? acceptable?

If only the first project was completed because of unforseen problems, limited geothermal resources or public outcry would the cost and disadvantages of the transmission line outweigh its advantages? My answer is yes. IM.7

My understanding is that exploratory drilling which is necessary to assess impacts of drilling has not been done. This needs to be done and analyzed in the EIS/EIR. IM.8

This Fourmile Hill project whether by itself or as part of a two to six project plan is the beginning of a bad tradeoff that the adjacent area will suffer from as well as the whole county and its people. It is precipitating a fight that if not resolved now will continue to drain precious energy on all sides that could be used to discover a more beneficial, less controversial use for our National Forest. IM.9

Sincerely submitted,

Brenda Willey
1600 Hill Road
Mt. Shasta, Calif. 96067
(916) 926-2842

Letter IN

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please omit any comments at the close of the public hearing or send comments by September ~~26~~ 30, 1997 the address listed at the bottom of the page.

ame: RAY WILLIAMSON
ddress: P O BOX 6
MT SHASTA CA 96067
hone: 916-926-4185

omments: WOULD LIKE TO SEE 4-CORNERS LEFT AS A SNOMOBILE PARK & NOT A "PARKING LOT FOR EMPLOYEES OF CALPINE." IN.1

I CHERISH THE WINTER & SUMMER RECREATION IN AND AROUND MEDICINE LAKE AND DO NOT WANT TO LOSE IT'S PRISTINE, QUIET BEAUTY TO THE HUSSLE & ACTIVITY OF AN EVERY DAY WORK AREA AND WASTE OF AN EXCEPTIONAL AREA. IN.2

Ray Williamson

f you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street

Letter IO

COMMENT FORM
For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

e value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please omit any comments at the close of the public hearing or send comments by September ~~26~~ 30, 1997 the address listed at the bottom of the page.

ur Name: SHARON WILLIAMSON
ddress: P O BOX 6
MT SHASTA CA 96067
hone: 916-926-4185

omments: WOULD LIKE TO SEE 4-CORNERS LEFT AS A SNOMOBILE PARK & NOT A "PARKING LOT FOR CALPINE EMPLOYEES!" IO.1

WINTER & SUMMER RECREATION IN AND AROUND MEDICINE LAKE WOULD BE RUINED FOREVER! IO.2

Sharon Williamson

you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
00 W. 12th Street
Alturas, California 96101

Letter IP

COMMENT FORM

For the Fourmile Hill Geothermal Project
Draft Environmental Impact Statement/Environmental Impact Report

We value your comments on the Draft EIS/EIR for the Fourmile Hill Geothermal Project. Please submit any comments at the close of the public hearing or send comments by September 30, 1997 to the address listed at the bottom of the page.

Your Name: Joyce Wilson
Address: P.O. Box 54 ASTUGEWI
Hat Creek Ca
Phone: 916 335-1122

Comments: I oppose the Geothermal Project IP.1
the land is our Mother Earth. We
to whose care it is not does
belong. It is natural state. IP.2
We ask the Mother Earth
heal us what more do we
take from us. Leave our land IP.3
natural state. Don't disturb our
Ancestors. They still live there
these grounds. Landers do not
disturb Our land for your gain.

Astugewi
Joyce Wilson

If you wish, you can mail your comments to:
Mr. Randall Sharp
USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, California 96101

Letter IQ

PHIL WOODWARD
4340 EUREKA WAY
REDDING, CA 96001

12 September 1997

Mr. Randall Sharp, USFS/BLM
Fourmile Hill Geothermal Development Project EIS/EIR Coordinator
800 W. 12th Street
Alturas, CA 96101

RECOMMENDATION TO DENY APPROVAL FOR THE FOURMILE HILL GEOTHERMAL DEVELOPMENT PROJECT, STATE CLEARINGHOUSE NO. 96062042

The EIS/EIR for the Fourmile Hill Geothermal Development Project contains serious deficiencies and misleading information in environmental issues including hydrology, visual effects, and noise, and contains no supporting evidence that the project is even economically viable in light of the deregulation of the power industry in the immediate future. As a result, the EIS/EIR is decidedly bias in its approach to evaluating the project. Furthermore, development of an industrial project in this area would destroy the solitude and visual wonders enjoyed from overnight stays at the Little Mt. Hoffman lookout. The effects of this project are of particular concern in light of current plans for at least one and possibly two other companies to establish geothermal projects in the area. Because the effects of the proposed project cannot be adequately mitigated, the Forest Service must choose the "No Action Alternative" to preserve the unique environment of the Medicine Lake Highlands. IQ.1 IQ.2 IQ.3 IQ.4

A serious bias in the EIS/EIR is that many of the comments and investigations center around Medicine Lake, a developed recreational and part time residential area, and the main forest access road instead of the project site which is isolated from most human invasions. Background noise and visual interruptions from Medicine Lake are NOT representative of the Medicine Lake Highlands as a whole and should not be used to determine the effects of the project on noise or visual interferences. A proper evaluation of the project's impacts would be to use the ambient noise levels of the project area itself and the surrounding forest. Here background noise consists of the rustle of leaves, wind blowing through trees, and the occasional screech of a bird of prey. Instead the EIS/EIR determines "significant" impacts based on standards and benchmarks that are more appropriate for populated areas and/or industrial centers where ambient effects are quite high. Such standards are inappropriate for an evaluation in a quiet and pristine environment as the Medicine Lake Highlands. IQ.5

As a Registered Geologist, Certified Engineering Geologist, and Certified Hydrogeologist, I find the conclusion that the project will have no significant impacts to groundwater resources IQ.6

or the geothermal resources insupportable.

Current knowledge of the hydrology in the area, both groundwater and surface water is limited. The extent of the limited knowledge is apparent in any discussion in the text where a description of the hydrology is found. For example, page 3-21, paragraph 4 reads in part, "Date suggest that regional groundwater flow...". "...Shallow groundwater within the caldera appears to flow toward the center at a very shallow gradient, and probably discharges at...". "It is assumed that through the surface flow...." (emphasis added). And the fourth paragraph on page 3-41 summarizing the relationship of surface water , groundwater, and geothermal system has similar qualifiers in every sentence. Figure 3.4-2, a Schematic Cross Section of Medicine Lake Area has numerous question marks indicating unknown areas which are critical to understanding fluid movement in and around the geothermal source and the relationship with shallow groundwater and surface water. In short, no one knows what is happening with the hydrology in the area.

Groundwater and surface water flow in the Medicine Lake Highlands is indeed controlled by the highly fractured basaltic formations as described in the EIS/EIR. However, cavernous flow is also a controlling factor and one not discussed in the document. Lava tubes are common in the Medicine Lake Highlands, including one known tube system over 20 miles in length. Groundwater flow through such conduits results in surface effects similar to those found at Big Springs below McCloud, and the springs which supply the Fall River, Big Lake and Horr Pond in the Fall River Valley. The effects of the geothermal operation on subsurface flows and their interaction with surface waters are unknown. IQ.7

No chemical data is presented on geothermal fluids produced from wells in the area. The report states that the "...data from these wells are proprietary...". Without chemical information, no clear evaluation of the geothermal system and fluid chemistry can be made. It is possible the geothermal fluids produced could be harmful to plant and animal life in the area due to high concentrations of heavy metals such as arsenic, cadmium, lead, mercury, etc. The preparers of the report are remiss in not including the chemical information. Not all chemical information on the geothermal fluids is proprietary. The Regional Water Quality Control Board, Central Valley Region sampled geothermal fluids produced from wells 68-8 and 31-17 (formerly 21-17). That information is in the public domain and is available to anyone on request. IQ.8

The interpretation of the geothermal regime in the Medicine Lake area is limited and incomplete. For example, Figure 3.4-3 Hydrologic/Isothermal Cross Section Through Caldera Rim Fractures, on Page 3-43 shows two temperature gradient holes drilled to approximately 2000 feet and 3500 feet; however, the data is extrapolated to over 6,000 feet without any supporting evidence and without even placing question marks in the extrapolated areas as is customary in geologic investigations. The figure contains several features which are inferred (the Ascending Thermal Fluids Zone (red), and the Thermal Outflow Zone (pink)) but with no evidence of their existence or position. Isothermal lines are drawn with little data to support their position. This all serves to mislead the public that more is known about the geothermal regime than actually is. IQ.9

The visual impacts of the project, including steam plumes, buildings, lighting, and aluminum clad pipelines on the scenic beauty of the area, including designated Unique Geologic Areas, are serious and significant. The Visual Quality Objective in the area of Fourmile Hill is "retain". This requirement cannot be met with implementation of the proposed project and is, in itself, reason enough to deny the project. IQ.10

The EIS/EIR states steam from the cooling towers will be seen as a cloud. This may be true from several hundred miles away; however, for anywhere within 50 miles, it will be identified as what it is, an industrial discharge in the middle of a forest environment. On clear calm days, common in the fall and spring months, the steam plumes will be visible for many miles. This visibility will be enhanced due to the slow dispersion of the plumes under such conditions, resulting in plumes over 500 feet high and visible for fifty miles or more. IQ.11

Furthermore, moisture particles from cooling towers act as a nucleus for condensation of ambient moisture in the atmosphere and under certain moisture/temperature conditions or inversions commonly experienced in the area, will result in the formation of large fog banks or low level clouds. Such effects can easily be observed at the cogeneration plants and power plant in Burney and the Wheelabrator generation facility in Anderson. During an inversion, it is not uncommon to observe an opaque ground fog covering 10's of square miles in winter months. Under inversion conditions, the Medicine Lake Caldera would be completely fogged in by the moisture input from the proposed power plant. IQ.12

The evaluation of the impacts of noise appears to place more importance on a traveler in a car on the main road or in a crowded campground than a forest visitor hiking and enjoying the solitude of the area. The report casually states an exceedance of the Siskiyou County standard of 54 dBA L_{eq} would occur within approximately 3,200 feet of the wellfields and power plant. Assuming the noise would transmit in a radial pattern from the source, this exceedance would occur over an area exceeding 1 square mile. The actual area affected by the noise would be over 4 square miles before it was adsorbed by the surrounding terrain. IQ.13

Section 4.14, page 4-261, states "Noise levels during operations would not endanger the hearing of forest visitors in these areas, nor would they occur during noise sensitive periods such as night..." (emphasis added). This statement shows how disconnected the evaluation of the impacts of the project are from the actual site conditions and projected intrusions. While grateful that the project will not endanger a visitor's hearing, I am concerned that any noise will result in a significant disturbance. The latter portion of the statement suggests the power plant would shut down at night; however, it is doubtful this is what is actually planned. IQ.14

Other impacts from the project are clearly understated. The EIS/EIR fails to evaluate the combined effects of various disturbances at the site but instead analyses each disturbance, such a noise, steam plumes, and lighting, in an isolated manner. The combined effects of the steam plumes and lighting will cause a synergistic effect well beyond the descriptions stated for each individual effect. IQ.15 Reflected light from the power plant will become a large, dispersed glow in the moisture laden area of the steam plume. This glow will be visible for many miles away as a diffuse but easily identifiable source on the mountain. Again such IQ.16

phenomena is common around other cooling towers such as those in the Burney area and at the Wheelabrator Facility in Anderson

The cumulative effects of the visual and noise impacts of the project on the quiet solitude of the Medicine Lake Highlands will be most felt at the Little Mt Hoffman Lookout. The Lookout is a unique possession the Forest Service has allowed the public to enjoy. From the first beginning of sunrise to late at night, the solitude and unblemished view is an unique experience in Northern California. If the proposed project were to be constructed, the daylight periods would be dominated by steam plumes, shiny aluminum-clad pipelines, and the incessant rumble of the power plant. At night, the views of community lights over a hundred miles away would be obscured by the glare of lights, enhanced by reflection and diffusion within the steam plumes from the cooling towers and the effect of the noise being similar to that of living in an urban area. IQ.17

The economic viability of the project is questionable. In light of the deregulation of the power industry in the immediate future, such a marginal project would certainly run at a deficit. The project's proponents undoubtedly plan on selling out to a larger company with a more diverse and cheaper power generation capacity. By fluffing the portfolio of the larger, more diverse company to include a "renewable" or "green" energy source, the project suddenly become attractive as a public relations gambit. IQ.18 Not only would this project not make economic sense on its own, but the concept of renewable energy is false. It is not uncommon for the geothermal source to cool off or for the geothermal fluids to become exhausted (i.e. the geysers in Sonoma County). Then the project dies prematurely. The information necessary for such an evaluation apparently does not even exist. IQ.19

I urge the Forest Service to choose the No Action Alternative based upon the dubious economic viability of the proposed project, lack of necessary information to evaluate the effects on the hydrology of the area, and the incompatibility of such an industry with the natural peace and solitude, clean air and pristine forest, and unique geologic features of the Medicine Lake Highlands. This unspoiled area of California should be preserved for all to enjoy without the intrusion of a loud and visible industry where it doesn't belong. IQ.20

Phil Woodward

PHIL WOODWARD, R.G., C.E.G., C.H.

cc

Mr. Patrick J. Griffin, Siskiyou County Air Pollution Control District
Mr. Debra Reames, Earth Justice Legal Defense Fund

9/25/97

Randall Sharp, Project Leader
Modoc National Forest
800 West 12th St.
Alturas, CA. 96101

Mr Sharp,

I am writing to express opposition to the proposed Geothermal Project at Medicine Lake. I am a resident of Siskiyou County where I have been in Education Administration for many years. IR.1

The location of the proposed Fourmile Hill Geothermal Project makes it dangerously unsuitable for the following reasons:

- The destruction of the Late Successional Reserve and important wildlife habitat for martens, fishers and goshawks. IR.2
- The Native American religious/cultural significance and their ceremonial sites.
- Degradation of the prized recreational area used by a large number of Siskiyou and surrounding county residents.
- The affects to the Mount Hoffman Roadless area.

Please STOP this project. IR.3

Sincerely, Carol L. Wright

Friday Oct 24, 1997

Dear Mr. Randall Sharp,

I am writing to you this morning with grave concern after learning about prospective plans to build two giant geothermal projects in the Modoc National Forest.

IS.1

I guess the first thought I wish to highlight about this is, and I don't mean this for sarcasm's sake alone, but when is enough enough? When is enough development of precious resources enough? When will we have enough electricity? When will we stand up and say "No" more!

IS.2

Los Angeles isn't that far away, & yet it is sucking up water and electricity from far away, from pristine

↓ over

lands that don't support the high consumption life-style the big cities propagate.

We must have areas left untouched by human greed for more and more. The problem is not a statistical off-shoot of, say "more people, more need", but rather one that can be traced back to the individual like you and me who answers the question: is this in the truly best interest of all Life, our children, and the people that live where the development is to take place?

When we answer these personal questions with all the sincerity of our heart and conscious, then we are acting out of responsibility.

IS.3

Just some thoughts your way. No more extraction! Let's help heal the sacred Earth. Sincerely,

Carter

Letter IT

GRANT YOUSIE
9112 ROCKY RD.
WEED, CA 96094
(916) 926-5065

MR. RANDALL SHARP
USFS/BLM
FOURMILE HILL GEOTHERMAL DEVELOPMENT PROJECT EIS/EIR COORDINATOR
800 W 12th ST.
ALTURAS, CA 96101

Mr. Sharp,

I would like to make a few comments about the Fourmile project.

First, I do NOT think there is any reason to commence with this project. There is absolutely no reason to develop geothermal, especially in the light of fact that we have at our disposal numerous alternative energy sources that are far more environmentally friendly than the proposed project. Solar energy is of age, as is Hydrogen fuel cells or Biomass or wind power. IT.1

Second, it is time that the forest service stop playing pawns to the large energy brokers who are determined to destroy every inch of wild land on the planet for unnecessary greed. A series of solar panels on the roof of every house in the country makes far more sense than the further irreversible destruction of sacred lands. IT.2

Finally, as you know the Medicine Lake area derived its name from the fact that it exists as medicine for the soul. There is no soul or spirit in a geothermal project and watching a television powered by a geothermal power plant in an air conditioned house powered by the same apparatus is no replacement for the medicine at Medicine Lake and the surrounding area. IT.3

Thank you,

Grant Yousie
8-22-97

Letter IU

1938 Hill Road
Mt. Shasta, CA 96067

September 11, 1997

Randall Sharp, Project leader
Modoc National Forest
800 West 12th Street
Alturas, CA 96101

RE: Fourmill Hill/Telephone Flat Projects

Dear Mr. Sharp:

These proposed geothermal projects for the Medicine Lake Highlands are very ill conceived. The largest shield volcano in North America, and maybe worldwide? Native American sacred places, old-growth forests, and rare species? And the potential power to be sold to Oregon? IU.1

I've been recreating there since 1968. It is an irreplaceable place. Please rethink - and preferably cancel this project. IU.2

Very truly yours,

Michael Zanger

Letter IV

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. IV.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. IV.2

Sincerely

Letter IW

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. IW.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. IW.2

Sincerely

Letter IX

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. IX.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. IX.2

Sincerely

Dick Carnell

Letter IY

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. IY.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. IY.2

Sincerely

Laurie E Denham

Letter IZ

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. IZ.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. IZ.2

Sincerely

Letter JA

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JA.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JA.2

Sincerely

Letter JB

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JB.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JB.2

Sincerely

Dawn E. Parkhurst

DAWN E. PARKHURST

Letter JC

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JC.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JC.2

Sincerely

MATT PARKHURST

Letter JD

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JD.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JD.2

Sincerely

Robert J Piper

Letter JE

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JE.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JE.2

Sincerely

Mark Dowell

Letter JF

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

Dear Mr. Sharp

I would like to express my support for the position taken by Bill Dart in regard to the geothermal development project in your district. JF.1

I do not believe recreational opportunities should be sacrificed to the development, and oppose any area closures during the winter. The plan should work toward retaining the present character of the forest and its public uses. JF.2

Sincerely

Emery Sweet

Letter JG

November 20, 1997

Randall Sharp
USFS/USBLM
Fourmile Hill Geothermal Project
800 W. 12th Street
Alturas, Ca 96101

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Ken Wallace

Letter JH

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Le Roy Walland

Letter JI

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H Clayton Whatmarsh
1257 Lord Way
Kings Beach CA
96143

P.O Box 1787

November 20, 1997

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USFS/USBLM
Fourmile Hill Geothermal Project
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Sincerely

* * *

COPY

FOURMILE HILL GEOTHERMAL PROJECT

PUBLIC HEARING ON THE DRAFT EIS/EIR

* * *

REPORTER'S TRANSCRIPT OF PROCEEDINGS

* * *

TUESDAY, AUGUST 5, 1997

* * *

7:00 P.M.

* * *

DORRIS CITY HALL

DORRIS, CALIFORNIA

MICHELE D. DANCER, CSR 9199
CERTIFIED SHORTHAND REPORTER
PO BOX 286
MACDOEL, CA 96058

(916) 398 4294

DORRIS, CALIFORNIA; AUGUST 5, 1997

* * *

MR. SHARP: Yes, ma'am. Please stand and state your name.

MRS. HAZELWOOD: Margaret Hazelwood, Dorris, California. I've got about a half a dozen here. I was told -- I'll go one and let somebody else go next, and --

MR. SHARP: Whatever you want to do.

MARGARET HAZELWOOD: In what way will this project impact the Modoc Volcanic Scenic Byway, the proposed byway? This has been supported by Dorris city and the people, by the Chamber of -- Butte Valley Chamber of Commerce, as well as the service agencies and organizations in this community. PH1.1

MR. SHARP: I can respond to that. It is addressed in the EIS. Basically Modoc Volcanic Scenic Byway, the plan for that says that current forest activities will occur, and those activities will not be inconsistent with the use of that scenic byway. The project is consistent with the use of this scenic byway, that's because it is a public use of federal lands, and as such, the scenic byway is to make public use of federal lands.

MRS. HAZELWOOD: Yeah.

MR. SHARP: Wait or go to number two now?

MRS. HAZELWOOD: Margaret Hazelwood, same information. It's my understanding that when Orr Lake was dammed up, Butte Creek went dry and the native fish PH1.2

population was destroyed. Has anything of this nature been looked into for the -- any possibility of anything like that occurring on up out there once this is done?

MR. SHARP: The effects of the water quality of Medicine Lake and the surrounding lakes were looked at in relation to water quality and quantity, and the effects of that, if there were to be any, and what it would be on the fish population, and they decided there would be no impacts to it.

Correct me if I'm wrong, if I'm -- Laurie and Hub.

MS. McCLENAHAN: That's correct. We don't expect any effects on surface water on basically the quality or the quantity. No effects on fish, if any, are expected.

Medicine Lake is about the nearest water body, and we did an analysis to see what the effects would be on the Medicine Lake.

MRS. HAZELWOOD: Thank you. Am I the only one?

MR. SHARP: Well, keep going, it's easier on Michele.

MRS. HAZELWOOD: It's also my understanding that Calpine's market for any power that was found did not happen. PH1.3

MR. SHARP: I can't speak on behalf of the company. I know they're aggressively looking for a market. They are in discussion with various companies; unfortunately, we don't have a representative for the company to -- Dave, do you want

the speak for -- no, you're --

MS. FISHER: PBA is a potential buyer of the output. There is a lot of interest in the northwest for other utilities to purchase green power from the human resources such as geothermal.

MRS. HAZELWOOD: I asked this before and I can do it again, I guess. In what way will this benefit us, the local people; will we get any of that power? PH1.4

MR. SHARP: I think I -- Kathy, did you want to respond to that?

MS. FISHER: I think your utility provider is Pacific Power?

MRS. HAZELWOOD: That's right.

MS. FISHER: And I don't know whether they would take any of that power or not.

MRS. HAZELWOOD: Thank you.

MS. McCLENAHAN: I can add to that, in that the power basically goes into the grid, and the electrons go wherever they go. Maybe you could get a Calpine electron.

But the benefits to the local community are generally in terms of the revenues brought into the area through payroll spending, the jobs that are created, and that's discussed in the environmental document. And the effects would be dispersed throughout the area.

MRS. HAZELWOOD: I can say that I asked this question before, and asked specifically what local people PH1.5

would be employed, and was informed that in fact other than during construction, possibly local people, but that this would be very high tech and it was highly unlikely any local people would be hired.

MS. McCLENAHAN: Again, I wish Calpine was here.

MRS. HAZELWOOD: So do I.

MR. SHARP: Thank you. State your name for the record here.

MR. CONANT: Tim Conant, I'm with Calpine.

MR. SHARP: Could you spell that?

MR. CONANT: C-O-N-A-N-T. Operation personnel -- the operations personnel would have to have previous power plant experience. The local people with previous power plant experience, they would surely be considered.

There are other jobs within the mechanics, and you got a lot of logging around there; there's probably several jobs that go to local people, you know. I can't specifically say George down the street is going to get a job because of this project. But there are mechanics and electricians, and in the -- your logging industry you use a lot of those same skills. And to get other people who are qualified, if they apply, we can't make guarantees that they are going to get jobs.

MR. SHARP: I know talking with the project manager, I don't want to speak on behalf of you, Tim, but Ed Merrihew, project manager on behalf of Calpine, has indicated

the company likes to hire local, if they have the training and skill here, because those individuals have a somewhat of a desire to stay in the local area, if they have the skills, the ability to do it.

MR. CONANT: That's exactly right, if we can.

MR. SHARP: Yes, sir.

MR. FARBER: Paul Farber, Klamath National Forest. Ed Merrihew, I introduced him to the Siskiyou County -- what do they call this, environmental training coordinator, and he said that they got together and came up with the skills needed at the plant. And if this project is approved, they are going to get together and come up with a training thing at COS so that the local people can go there and take the proper training so they can compete for the jobs up at the power plant.

So there's a good possibility that some local people from Siskiyou County would be working on the power plant. But like he says, you don't know who. They got together, when they had the meeting at Tulelake, they sat down for about a half hour and discussed how to set this thing up, and -- if the project was going to go ahead.

MR. SHARP: Thank you. Other questions?

Yes, sir.

MR. RICKERT: Jim Rickert, and I am the ranch manager for the Spring Creek Ranch at Fall River Mills.

I read the draft document here, and it seems quite PH1.6

uncertain about the relationship between this project and the springs at Fall River. There's a question there that doesn't seem to be addressed at this point.

We have a concern whether it might be either a water quality problem that might develop out there, a volume problem that might develop out of this, and it doesn't seem to be addressed. They say the water goes out that way, we're not sure how much.

On page 4-24 it says there's some uncertainty about the geohydrologic connection between the Medicine Lake area and Fall River Springs, but that's as far as it seems to go. There's no discussion about what really is going on there.

We think it's an important resource and ought to at least be addressed. Thank you.

MS. ELLIS: My name is Maria Ellis, and I'm also from the Fall River area. I'm a biologist and working with the Shasta Crayfish, which is a federal and state listed endangered species since 1990.

I do some private consulting work for PG&E, Fish and Game, Nature Conservancy, most related to the Shasta Crayfish and other rare species that are found in Fall River drainage.

I'm also working on my doctorate, and that is on the Shasta Crayfish. That's through the University of Michigan, at Ann Arbor, Michigan, so I'm a bit far from there.

First, I'd like to support what Jim Rickert said. We do not believe that the EIR/EIS addresses our concerns. We don't believe that it has addressed anything related to potential impacts to Fall River. PH1.7

And what I'd like to do is read to you a letter that is from the Fall River Resource Conservation District and Tom Grose of the Colorado School of Mines and myself.

MR. ADAMS: I have the report.

THE REPORTER: If I could get a copy of that.

MS. ELLIS: "Dear Mr. Sharp, the Fall River Resource Conservation District, Fall River RCD, in cooperation with Dr. Thomas Grose and Maria Ellis would like to comment on the Draft EIS/EIR that was recently issued for the Fourmile Hill Geothermal proposal.

"Dr. Grose informed the Fall River RCD, that the document was available. Unfortunately, no copy has been sent to the Fall River RCD, and additional copies are apparently unavailable.

"The Fall River RCD has understood that our specific request to Randy Sharp to be included on all future mailings for any geothermal issues would include receipt of this important document. PH1.8

"Furthermore, the Fall River RCD provided written comments of concern in a letter dated December 4th, 1996. Not only were these concerns ignored in the EIS/EIR document, but the effort to present these concerns did not even warrent

inclusion on the mailing list.

"Reference EIS document Table of Concerns raised during the public scoping period.

"Fortunately, a copy of the EIR/EIS was located and a review was possible.

"As the U.S. Forest Service project coordinator for this proposal, it's your responsibility to see that all legitimate concerns of the public are addressed in the environmental review documentation.

"The failure of this document to address or even acknowledge these concerns is unacceptable.

"Our comments were based on many hours of consultation with some of the leading geologists in the nation. These experts are well versed in geothermal development, and the concerns raised during these discussions are based on sound scientific evidence of a potential connection of the Medicine Lake Highlands to the source spring areas for the Fall River.

"Our primary concern remains that not enough is known about this interconnection to safely proceed with geothermal development. The failure of the EIS/EIR to address that concern is apparent. PH1.9

"Of further concern has been the resistance of the U.S. Forest Service, Bureau of Land Management, Weiss and Associates, Bonneville Power and others to aggressively pursue existing proposals by Lawrence Livermore Laboratories

to research this interconnection through isotopic testing, helping us to better assess the risks.

"Do the guardians of our public resources feel that this study would pose unacceptable delays to this project? Does the value of the pristine spring systems feeding Fall River or the value of the threatened and endangered species in those springs warrant such a study?

"Below are listed our specific comments and concerns on the Draft EIS/EIR for the Fourmile Hill Project.

"We continue to hope that these concerns will be taken seriously, and we intend to follow up whatever course is necessary to insure that our resources are not put at risk.

"Number one: The critical subject of the regional hydrogeologic setting of the Fourmile Hill prospect area is simply not discussed. Mention is made of the Fall River Springs, but dismissed on the basis of perceived, but not substantiated, groundwater flow directions being away from the springs, et cetera. PH1.10

"Powerful evidence indicates that basically the regional gradient is southward. There's no discussion at all of this probability.

"Number two: Drainage basis supposed in the EIS -- drainage basins as supposed in the EIS are simply based on weak topography. The deeper systems at least will be forced to flow in significant part southward along the base of the PH1.11

Medicine Lake volcano, and to escape at the low point or subsurface spill point along the south margin of the volcano edifice, and from there to the Fall River Springs.

"I cite these interpretations as an example of what is likely to be true. The EIS ignores or doesn't understand these likely hydrogeologic conditions. Field data are required to resolve these problems.

"Number three: The supposed volcano-wide, clay-rich, ash-flow tuff that is presumed to act as a caprock to the geothermal system is an interpretation without substantiation, unless all the proprietary well data support it.

"But the reader has no way of checking it." And it references Figure 3.4-2 and Figure 3.4-3. PH1.12

"Basaltic shield volcanos are not known for such layers anywhere, at least of the magnitude assumed for this prospect.

"Number four: It is assumed that a deep hot water zone is neatly isolated from a shallow cold water zone by this assumed widespread insulating thick layer. Geologic and geophysical evidence, i.e., modern faulting, seismicity, et cetera, of the volcanic behavior says otherwise. PH1.13

"Again, the subject is not discussed, and it should be.

"Number five: The reader of the EIS, trying to understand it, is handicapped, since much of the required PH1.14

credible substance is shrouded in the realm of well data stated to be proprietary. The physical geology of the geothermal system is unknown, but is presented as speculation, assumption, unsupported -- at least in the EIS -- interpretation, and incorrect analogy. Consistencies and omissions occur.

"Number six: Most serious, the basic question of how geothermal activities anywhere on the Medicine Lake volcano may affect the Fall River Springs system is not addressed. What is the level of risk to the Springs and why? If we do not know, what do we -- what do we do to find out? Known geologic evidence firmly supports some risk. Risk must be evaluated, not dismissed on the basis of one or two suppositions as the EIS does. PH1.15

"Number seven: Most disturbing is the fact that the above concerns and many other just-as-important related concerns have already been expressed and presented in writing in a timely fashion through proper channels in the environmental review process for inclusion in the Draft EIS, and they were not included in the Draft EIS. PH1.16

"I'm referring to three letters; a letter to Randy Sharp from the Fall River Resource Conservation District and Tom Grose and Maria Ellis, dated December 4th, 1996; letter to Randy Sharp from Peter Stent, February 10th, 1997; and a letter to Randy Sharp from Fall River Resource Conservation District dated February 18th, 1997.

"Number eight: USGS hydrogeologists have undertaken a study to determine the chemical and other similarities of the Fall River Springs and Medicine Lake Highland source area. The data that this study produces should also be considered in the final EIS/EIR document.// PH1.17

"Unless the foregoing concerns are explicitly addressed in a rigorous, thorough and scientific manner, we believe the Draft EIS/EIR would be incomplete and will not satisfy the many laws which have required its preparation. PH1.18

"We suggest that a comprehensive analysis of the foregoing is mandated under the law and request that such an analysis be considered within the final EIS/EIR before any permits are issued."

MR. SHARP: Thank you. I apologize if you didn't get a copy.

MS. ELLIS: I requested one about two weeks ago. Nancy Gardener sent a press release, she told me that the amount of public interest was more than expected and that they were out of copies.

I suggested that that might be a good reason to make more copies. PH1.19

She suggested that I borrow one from someone in Fall River.

I suggested that if more copies were made or more copies were found, that I would sincerely like one to be sent to me.

MR. SHARP: One will be sent. It might be after the letters are submitted. We have gone through -- they are on the second or third printing now.

MS. McCLENAHAN: Second.

MR. SHARP: Matter of fact, Peter Stent from Thousand Springs Ranch has requested three additional copies, I believe, which I believe have been sent to him.

Regarding your discussion with the Lawrence Livermore Laboratories, the USGS, with Livermore Laboratories, Weiss and Associates and myself, sat down in a meeting discussing that. Present for Lawrence Livermore was Tim Rust and the evidence that was presented there was that they concur, without having going through the calculations, that there is separation between the geothermal resource and Fall River.

MS. ELLIS: That wasn't in a summary I got from Tim Rust.

MR. SHARP: I can't say what Tim said, but he was at the meeting sitting next to me.

MS. ELLIS: That wasn't his conclusion. They thought that study was still necessary to determine whether geothermal development would have any impact on the Fall River, and I can get it.

MR. SHARP: If they had any, all I can relate is what he said to me.

MS. ELLIS: I'll give you a copy of the E-mail he

sent to me.

MR. SHARP: You can believe me or not, but he said that.

MS. McCLENAHAN: I'd like to point out that Weiss and Associates is associated with the Telephone Flat Project and is a separate group. There are two environmental reviews going on.

MS. ELLIS: Right.

MR. SHARP: And I believe USGS -- Peter Stent and USGS did a sampling, Weiss and Associates and Peter Stent agreed to the USGS doing a sampling and --

MR. POORE: Yes, he did.

MR. SHARP: -- it still hasn't been completed. I talked to him last Thursday.

State your name, please.

MR. POORE: Sorry, excuse me, Rick Poore, I'm manager at the Thousand Springs Ranch; my employer is Peter Stent. And as long as we have gone through this introduction, I'd like the opportunity to support what Maria has read from the letter from Fall River RCD, which I'm the director.

I would also like to include the comments that we are intensely interested in the potential links between this project and Fall River Springs system, and follow closely any developments. We'd like to see any information available which would substantiate what was stated in the EIS.

PH1.20

MS. ELLIS: The data --

MR. SHARP: Name?

MS. ELLIS: Maria Ellis. Says, "The data put forth in this EIS/EIR." I mean, I think the progression is something like, "Very little data or no data exists on ground water flow, data supports --" this is many pages apart throughout the report.

That's the first statement, "No data or little data exists on the ground water flow in the Medicine Lake Highland area." Sometime later it says, "Data," it says, sort of vague term, nonspecified, "supports the ground water flow goes the same direction as surface flow." And then, "Surface flow is north, so Fall River is not a problem."

And in my years of schooling that's not how the scientific method goes. You collect data in the field and then you analyze it. I mean, I can read his summary of the meeting, if you want, but --

MR. SHARP: That may be for a different -- the Telephone Flat Project I think it would be more appropriate. But if you want to, I mean --

MS. ELLIS: He was stating what the consultant from Weiss and Associates, at the Telephone Flat Project, but our concerns are equal with both projects. That consultant presents an interpretation of the existing data and essentially conclude there are only two sources of water for Fall River Springs that comes from Medicine Lake Highlands.

PH1.21

He is really trying to twist the information any way he could to make it seem like there's a total disconnection between the springs and the geothermal system.

I did not appreciate the way he tried to bias the data. Moreover, although some chemical isotopic data do exist on geothermal well water, it's currently proprietary. So he was -- he was not convinced.

MR. SHARP: I want to go back.

MRS. HAZELWOOD: Margaret Hazelwood. // It pretty much brings me up to what I really would like to hear, and that is on what information are the decisions going to be made whether or not to go through with this project, which route it will take and so forth? PH1.22

I asked earlier the water situation, because I know that it's tricky. And I just heard some very well-educated people discuss that very issue.

MR. SHARP: I guess the textbook answer, I'm not the decision-maker on it, but I assume they will use that environmental document, the final EIS/EIR, as a basis for their decision.

MRS. HAZELWOOD: Thank you.

MR. SHARP: But I don't know what else goes into the decision-making processes.

MR. SHARP: Your name, please?

MR. POORE: I'm Rick Poore again from Thousand Springs Ranch. // In the early stages of the EIS we noticed PH1.23

that significant comments made during the public scoping period were -- our comments were completely absent from the listing; do you know of any reason why those were not considered? PH1.24

MR. SHARP: Laurie?

MS. McCLENAHAN: As I mentioned to Peter Stent on the phone, it wasn't a matter of your comments being completely ignored. I think what Peter was referring to when we spoke was in the summary, instead of talking specifically about the effects on the Fall River Springs, Fall River Mills area, we characterized it as effects on the regional ground water quality and quantity. Because as I mentioned, there was concern at Fall River Mills, there's concern in other areas surrounding -- we're trying to avoid singling out one particular area, and to acknowledge in the summary that there are concerns about the effects to regional ground water and surface water issues.

MR. POORE: Could you, for the record, define "regional."

MS. McCLENAHAN: We define the region in the beginning of the hydrology sections to include the Fall River Mills area. Do you -- it was brought up as an area of concern. So the regional area that we contemplated as a study area for hydrology considered Fall River Mills. And I think that's stated in the section 3.3, I believe it is, where --

MR. POORE: Our concern is very little consideration was given to the potential impasse or the potential interconnection between the Fall River Springs source area and the Medicine Lake Highlands, which is the recharge area for the springs. Very little attention was given that in the EIS, making us naturally feel that it was being brushed under the rug, so to speak, as a potential hindrance to the project. That's where our concern lies, and it was not treated in a very in-depth fashion in your documentation.

MS. McCLENAHAN: I understand that concern. And from our perspective, I can assure you we spent a lot of time looking at the issue of effects of regional ground water, not just Fall River Springs, Fall River Mills area.

The problem we have is we have an 800 page document right now, and it's a very complicated project, in that you have the construction phase, the operation phase, and the decommission phase to address.

We have a well field, a power plant, and a transmission line, and we also have seven -- a total of seven alternatives, including the proposed action. That really requires us to focus what's presented in the environmental document; the regulations require that we provide a concise analysis, and --

MR. POORE: In other words, you were too busy dealing with the focus, you were not going to deal with the PH1.25

issue of Fall River?

MS. McCLENAHAN: No, that's not what I said. What I said is we summarized conclusions in the document and did that. These are -- we spent a lot of time --

MR. POORE: Conclusions that were based on data that are referenced as being proprietary; will those be made available for a review? PH1.26

MS. McCLENAHAN: That's up to Calpine whether or not they want to give proprietary well data, that's not under our control. Our hydrologist looked at the proprietary data, the BLM and Forest Service also looked at the proprietary data.

MR. POORE: So then, you're asking us to simply trust the geologist that this has no effect on Fall River, and allow you to move forward with a project without further comment, without review today, doesn't that -- wouldn't that be difficult for you to do if you were in our position? PH1.27

MS. McCLENAHAN: I understand that concern. The proprietary data is not -- that not something that's within our control over.

MR. COOK: My name is Jeff Cook, I'm also from Fall River area. My concern, listening to this conversation, is whoever the powers-that-be are, who will make the recommendation to either go along with the project or scrap the project or go with which alternatives, are they also only going to be given this proprietary data, which we have, which PH1.28

is nothing, I would argue, to -- upon which to base their decisions?

There's nothing existing there to me that says there's no connection; it's smoke and mirrors. So if that's all they get, I would say that that's -- this is an inadequate document.

MR. SHARP: Name, please?

MS. ELLIS: Maria Ellis.// Until Friday, when USGS came to Thousand Springs, to my knowledge they didn't collect any data from Fall River. So with just data from the wells and Medicine Lake, how can they say there's no connection to Fall River? Even if this data, you know, exists, it's incomplete, it's only half a picture. So how can they talk about whether there is or is not a connection?

PH1.29

MR. SHARP: They have some data production from east of the Fall River Mills area; they were not out at the Thousand Springs Ranch, they were not allowed in -- if they'd definitely been allowed on there for further data collection -- I'm not trying to cloud the issue, however, the communication on it was --

USGS has their closed files versus open files we're trying to get released now to the public. And there are regular weekly peer reviews and they come down for department public review and the public can review them.

MR. RICKERT: Jim Rickert, Spring Creek Ranch. You said that the USGS had collected data from something east

of Thousand Springs Ranch?

MR. SHARP: That's what I was told.

MR. RICKERT: There is only really three sets of major spring water; they have one and we have the other, and the one is in the park. If it wasn't us, which it wasn't to my knowledge, unless they've been trespassing, it wasn't us, then it had to be in the park. So, you know, if that's sampling a public resource I would assume we'd be able to find out that information.

MR. POORE: It was from, I believe, a previous site sampling, according to our --

MR. SHARP: It should be public, I think. That probably is in the public file, open file report. The USGS has a review on their open reports.

Margaret?

MRS. HAZELWOOD: Margaret Hazelwood. Someone brought up there that I am -- and I been on vacation, I just got back and found this, among other things in the mail. I looked at it just in a very cursory manner, but I didn't see the public comment that I expected to. I saw where in the Butte Valley Star there was indication of a meeting is going to be held, but I didn't see anything that after the meetings were held what the public comments were.

PH1.30

I am very interested to know what they are and if this was available, I would like a copy.

MR. SHARP: There is a document, probably the

interim public scoping document prepared by EMA -- excuse me, MHA. And the project -- and I'll be glad to, at the end, to provide you with that.

MRS. HAZELWOOD: Thank you.

MR. SHARP: Did you get down to number ten?

MRS. HAZELWOOD: No, I'm writing down answers. And this is too much for -- obviously, especially for a layperson to assimilate. I did talk to Calpine people down at Goosenest, and at that time it didn't seem to me as though they had some pretty important answers. There was an engineer there who was local, and he talked to a vulcanist, right?

MR. SHARP: Volcanologist?

MRS. HAZELWOOD: And asked them engineering questions that he was unable to answer. And what I asked about was what I felt like was important to people here. And the jobs issue was one of them, and to what degree this would actually benefit the area from which this power is supposedly going to be generated. And I never have received anything other than very general kinds of statements on those issues. PH1.31

Supposedly Siskiyou County is going to benefit in some ways; I haven't heard anybody tell me exactly in any way I am interested. I mean, after all, we all know how we feel about the water going to Los Angeles. PH1.32

MS. McCLENAHAN: The socio-economic effects --

MRS. HAZELWOOD: That's correct.

MS. McCLENAHAN: -- are addressed in section 4 point --

MR. ADAMS: 16. And there's also -- there's a summary of I think the anticipated royalty payments, et cetera, in -- I think it's towards the end of section 2 dot 2, that may provide some of the details that you're looking for.

MRS. HAZELWOOD: Thank you.

MR. SHARP: Any more comments? I don't know about you, but it's been a long day for me.

Did you get a copy, do you have --

MS. ELLIS: Um-hum.

MR. SHARP: I can provide you with one, we have a copy here.

Well, thank you.

(The public comment portion of the hearing concluded.)

--oOo--

COURT REPORTER'S CERTIFICATE

This is to certify that I, MICHELE D. DANCER, a Certified Shorthand Reporter of the State of California, was present at the time and place the foregoing proceedings were had and taken in the within matter; and that as such shorthand reporter I did take down in shorthand writing the aforementioned proceedings; and afterwards caused my said shorthand writing to be transcribed into typewriting, and the foregoing pages beginning at the top of Page 1 through Page 24 to be a full, true, correct and complete transcription of my said shorthand notes.

DATED: This 23RD day of September of 1997.

MICHELE D. DANCER, CSR No. 9199

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COPY

FOURMILE HILL GEOTHERMAL PROJECT

PUBLIC HEARING ON THE DRAFT EIS/EIR

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REPORTER'S TRANSCRIPT OF PROCEEDINGS

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WEDNESDAY, AUGUST 6, 1997

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7:00 P.M.

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SHILO INN CONVENTION CENTER

KLAMATH FALLS, OREGON

MICHELE D. DANCER, CSR 9199
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PO BOX 286
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(916) 398 4294

KLAMATH FALLS, OREGON; AUGUST 6, 1997

* * *

MR. SHARP: We'll now take any comments from the public. Comments?

MR. BLAKENEY: My name is Jack Blakeney, and my family owns approximately ninety acres on the south side of the lake, and has since about 1919 or somewhere in that vicinity.

According to your output on air quality, prevailing wind blows across the lake from the powerhouse across the lake. And I've been up there for fifty-plus years. My mother has been up there for I don't know how many years, but it's --

MR. SHARP: You're not going to tell us?

MRS. BLAKENEY: I will tell you. Since I was eleven or twelve, and that's a few years ago.

MR. BLAKENEY: Like I say, our family owns in the south quadrant, southwest quadrant, which is next to your old headquarters or supposedly old headquarters campground and so forth.

I've spent enough time over the years to know that the Route A1 will disturb eagles. I'm more interested in eagles than I am goshawks and the rest of these.

Less than fifteen years ago there wasn't a forest service employee that knew there were any eagles at Medicine Lake. We had -- we had officials from the Tulelake station PH2.1

come up there and sit in my camper drinking coffee, and he finally spotted an eagle.

But ninety-nine percent of the people that have been with the forest service had never seen an eagle, and these eagles have been flying around up there at the lake for well over fifty years. And they do go over and land on that lava bed directly across from the lake or live where your A1 is. They land on that and feed back in there.

And there's also a swampland back in there that is not noted in this, showing the salamanders and stuff that are back on this lower side of this -- there are some salamanders. I'm not a biologist so I don't know which ones are the endangered salamanders and so forth, but I know there are some around Burney that are. PH2.2

I'm definitely opposed to running the power line down around A1 and A2. A3 was my personal choice, would be the much better choice. It would leave the hot spots still left to natural terrain, even if it's swinging your power lines at 1400 feet tower to tower or whatever you want to swing them, though you'll be crossing an area that is -- well, I consider more sacred than any Indians probably would, the hot spots and that lava bed. But we look directly across from our property. PH2.3

And like I say, there's a statement in here that the wind does not affect it, but wind does blow across the lake, which is generally in the evening; blows from north to PH2.4

south coming right down that canyon where you propose the power lines.

Also, that was destroyed once before. But that was the old wagon road around that side of the mountain when they first brought the first -- and everything else into that lake, they came right where your power line comes down. And where they destroyed is one road that goes around the lava bed.

Like I say, I've worked on five geothermal power plants, I don't find the noise a problem, I don't find -- in fact, I know they're not that noisy, once the construction is completed. PH2.5

And I'm too rattled to make any more comments, but I -- like I say, I'm definitely opposed to running that A1 power line. And I read in your -- that as I read it, the forest service is actually proposing more to run A1 around close to the lake. PH2.6

And I want to know why, if the forest service is proposing that route, is it so the forest service can get electricity in there to the campgrounds or -- and develop the area?

MR. SHARP: Well, I -- no, no, it was not.

MR. BLAKENEY: Close enough now to drop your power lines off it if you run it on the A1.

MR. SHARP: That was not the -- as far as I know.

MR. BLAKENEY: I understand that, but the way I

read this article when it was -- one of the portions of it stated that the forest service preferred the A1 route. And I think you could appreciate, being in the forest service, that you wouldn't want to sit there and look across the lake at a set of power lines. Even if they paint them brown, which I don't think they can do. PH2.7

And also, same thing, still got this Modoc Volcanic Scenic Byway, as far as I know is still hanging also somewhere along -- I'd like to know where it stands. PH2.8

MR. SHARP: That's a little bit outside the scope, but I can provide you --

MR. BLAKENEY: It isn't out the scope. You'll be using the same roads that designated for the --

MR. SHARP: And that relates -- should be described in the document, just for your information.

MR. BLAKENEY: I didn't find it. At least I don't remember reading.

MR. SHARP: Use of rec --

MR. BLAKENEY: I'm not as sharp as I was ten years ago since I had my stroke, so I won't bump heads with you.

MR. SHARP: The scenic byway, we, the forest service did some maintenance on those roads to increase the travel-ability I guess, if that is a word, directly along the -- some of the roads. You see, it's a little easier to travel, and you don't have to strap yourself in so much.

MR. BLAKENEY: I can't tell you how many forest

service vehicles have come to damn near run me off the road traveling that stretch from the top of the hill to the lake. Yes, it's been brought up many, many times.

MR. SHARP: And we are in the process of doing a signing program. It's a financial thing; got to have money to do things.

MR. BLAKENEY: Got to have the money. I live on a budget.

MR. SHARP: Yeah. Our budget is going to get less, thank you.

Laurie is also capturing the kind of key points of the comments, too, up here. I forgot to mention that.

Other comments?

MRS. BLAKENEY: I would like to say something about the Indians.

MR. SHARP: Could you state your full name, please.

MRS. BLAKENEY: I'm Marian Brownell Blakeney, and my dad taught me to be sure and be aware of all that I saw that was surrounding me. So that is my reason that I'm making this remark.

You remarked about the Indians, I'm not too proud of the Americans and what they have done to the Indians. And I see this area where you're going, and you maybe just pick up a branch and you see an arrowhead. Many, many arrowheads we have picked up around Medicine Lake. Maybe not picking them up, just kicking them over. PH2.9

I'm not too proud of us. Somebody wins and somebody loses, I'll grant you that. I hate to see too much going on along around Medicine Lake, having been there so long.

We see what's happened to Yosemite, we've seen what has happened to Yellowstone Park. We've got to draw back somewhere. I don't know where that is to be.

An eagle nest; did you ever crawl up into one? There's one at Medicine Lake, and I crawled up into it. It's almost as big as some of the apartments that we have. It's a huge thing. Do I want that destroyed by tourists?

I'll shut up, just like my son. But it's very dear to me.

MR. SHARP: Thank you.

MR. BLAKENEY: Everybody else must be a federal employee.

MR. SHARP: Comments? Well, if you want to just discuss the items on a one-to-one conversation, we do have individuals here from Calpine Corporation that are specialists, geologists, engineers. Also we have air quality specialists that have provided information in the development of this document.

There's also a -- Brad and Jim are resource officers for the respective districts, if you have a question, and Pat from the Air Pollution Control District, or any of the -- Laurie or Hub, or you can even talk to me, if

you want to. I don't know too much, so --

If no other comments, I appreciate you coming, and you still have cookies there in the back there, so feel free to have some of those, if you want to go to a one to one conversation.

MR. BLAKENEY: I would like to point out, I'm all for the powerhouse, but don't run the line down by the lake. PH2.10

MR. SHARP: We have that on record.

MR. BLAKENEY: Appreciate it.

MRS. BLAKENEY: We'll all put up more kerosene lamps instead of electricity.

MR. BLAKENEY: Photovoltaic cells work real good.

MR. SHARP: Okay. I thank you for coming tonight, I know everybody has a couple things going at the same time no matter where you are in life, but we appreciate you coming tonight. Thank you.

(The public comment portion of the hearing concluded.)

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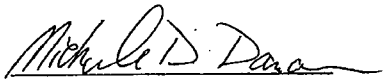
COURT REPORTER'S CERTIFICATE

This is to certify that I, MICHELE D. DANCER, a Certified Shorthand Reporter of the State of California, was present at the time and place the foregoing proceedings were had and taken in the within matter; and that as such shorthand reporter I did take down in shorthand writing the aforementioned proceedings; and afterwards caused my said shorthand writing to be transcribed into typewriting, and the foregoing pages beginning at the top of Page 1 through Page 8 to be a full, true, correct and complete transcription of my said shorthand notes.

DATED: This 19th day of September of 1997.



MICHELE D. DANCER, CSR No. 9199

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ORIGINAL

* * *

Fourmile Hill Geothermal Project

Public Hearing on the Draft EIS/EIR

* * *

REPORTER'S TRANSCRIPT OF PROCEEDINGS

* * *

Thursday, August 7, 1997

* * *

7:00 P.M.

* * *

Miner's Inn Convention Center

Yreka, California

RONALD W. COLEMAN, CSR #1596
CERTIFIED SHORTHAND REPORTER
322 W. CENTER STREET
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Thursday, August 7, 1997 - 7:00 p.m.

* * *

(Following an audio and visual presentation, proceedings were had as follows:)

MR. SHARP: I would like to open to public comment.

We have a court reporter here who will be transcribing what is said, so I ask you to state your name. And we will try to answer your comments, if you have a question.

With that, I will open it up.

MS. TUREK: My name is Jerry Turek, T-U-R-E-K.

// On the sale of the power that Calpine generates, do they have a buyer for that power at this point? // PH3.1

MR. SHARP: We have a representative from Calpine corporation, Ed Merrihew, project manager, and I guess I would like to turn that over to him, and maybe he could respond to that.

MR. MERRIHEW: Right now, we do not have a firm contract with anyone. We are marketing the power. And we have recently some bids that we are responding to for power. But we do not have a firm contract, no.

This is, to some extent, a pilot -- was originally decided on as a pilot program with BPA. BPA has yet to determine if they wish to buy that power. If

they do not wish to, we have to go out and find a buyer for that, if BPA does not wish to buy it. That decision has not been made yet.

MS. TUREK: Can the construction start on the project if the power is not sold prior to construction? PH3.2

MR. MERRIHEW: If we wished to, and we have permission and everything is approved, yes. It would be a merchant plant.

In other words, we are betting that we would have buyers because of the need for power. We will build the power plant and market the power. It is unlikely we would, but that's the deregulation environment that we are in today. A plant like that would be called a merchant plant.

MR. SHARP: And, Kathy, do you want to respond as part of the BPA on that?

MS. FISCHER: Well, Bonneville is considering purchasing the power, so we can't make a decision until the environmental review process is completed. We make our decisions based on environmental impacts and so forth. So we may be a purchaser. We may not.

JAMIE PAINTER: Jamie Painter.

What is the price going to be per kilowatt hour? PH3.3

MS. FISCHER: I don't know.

MS. PAINTER: How long would a contract period PH3.4

be for? Let's say for you, how long would you contract with Calpine?

MS. FISCHER: I think it is 30 years, is that right, with a letter of agreement? 30-year power purchase agreement?

MR. MERRIHEW: I think there is stipulations in it that I am not involved in, but I think that the entire package was for a four to five-year arrangement. I am not sure of the involvement or the processes it goes through. But I think it was four to five.

MS. PAINTER: If you find a customer to buy this power, how long are they expected to be your customer? Are they expected to be your customer for 30 years or are there short-term power agreements? PH3.5

MS. FISCHER: There is many different kinds of contracts that can be entered into.

MS. PAINTER: What if, in three to five years, this customer can buy power cheaper elsewhere?

MS. FISCHER: If you have a contract that goes for 30 years, you have to buy yourself out of it.

MS. PAINTER: But if they don't have a 30-year contract, they can get out of it.

MS. FISCHER: Right. Generally, power providers are going to try to get you to commit to a longer purchasing period. If you buy a short-term power, it is going to be a different price, different terms.

MS. PAINTER: //How many houses will this power provide electricity to? PH3.6

MS. FISCHER: That question came up yesterday.

MR. SHARP: One megawatt -- a thousand megawatts provides one house.

MS McCLENAHAN: One megawatt, a thousand households, or a household.

MS. FISCHER: It depends on where you live and whatever. That would depend on climate and where you live.

MR. SHARP: Yes, sir.

MR. SHOTT: Jim Shott, S-H-O-T-T.

First to you, can you give me a representative percentage of how many power plants in the west right now are not running to full capacity? PH3.7

MS. FISCHER: I don't know the answer to those questions. If you really want them, boy, maybe if we could talk later and I could get a list of those types of questions and get back with you. But I don't know the answers to all that.

MR. SHOTT: //I am kind of aware that there are quite a few power plants in the west right now that aren't running full capacity. And we know it is a little more expensive to produce geothermal. So someone is going to pay it, basically people living in little towns across America. You are not going to absorb the cost. PH3.8

Calpine isn't going to absorb the cost. It would be silly because you guys wouldn't be in the business, true?

MS. FISCHER: All I can say is, I don't know all the business sides of things. I am hoping to go through the process. Some of those questions are more than I can answer now. If you really are serious in wanting an answer to that --

MR. SHOTT: I will talk to you later and see if you can get me where I can get ahold of it. I would appreciate it.

MR. SHARP: Yes?

MS. BARROW: Marsha Barrow, B-A-R-R-O-W.

If the electricity is sold to Bonneville, does that mean the electricity goes to Oregon? PH3.9

MS. FISCHER: Bonneville sells its power to other utilities, so whatever utility would want to purchase this power, we have no -- because we haven't bought the power yet, we have no buyers. We have interested buyers and it could go to Oregon, it could go to Washington, it could go to Idaho, Montana, or Northern California, any of our customers.

MS. BARROW: I do have a couple of more, if I could. Maybe I will come back. It just says "decommissioning." //Nothing has been said about what decommissioning involves. // PH3.10

MS. McCLENAHAN: Yeah. Again, that is in

Chapter 2. It is one of the phases of the project. And what "decommissioning" means is at the end of the 45-year life of the project, it is envisioned that the project would be dismantled, the power plant taken down, the transmission taken down. It is hard to predict what will happen 45 years from now, technology changes so quickly. But we have envisioned that it would include some combination of recycling of concrete, of materials, scrap metals, things like that. It would be basically taken down, hauled away, and the ground surface restored to pre-project conditions or according to the Forest Service.

And throughout the document, we addressed the effects on each parameter of what that would mean. Calpine would be required to develop a specific plan at that time that would be determined by the BLM and the Forest Service about how they would want them to decommission and restore the project area.

MS. BARROW: To continue, I have a question about the pipelines. // There's how many wells that go to each plant? // PH3.11

MR. SHARP: There is approximately five well pads and each well pad, there would be various wells that drill directionally out.

MS. BARROW: Right. // And then the super-heated steam comes up, goes through these pipelines. So that PH3.12

would mean that the exterior of the pipes get hot?

MR. SHARP: They are insulated pipes. Probably they would melt snow, but I -- maybe I should turn that over to Tim, the engineer, who is more technically --

MR. CONANT: Actually, the snow will actually stand -- last on the pipe longer than on the ground. Insulation is four inches of fiberglass.

You can go and put your hand on the pipe, you won't get burned. You won't feel anything on the pipe itself. There will be more heat from the solar energy absorbed into the surface material, which is -- and there will be warmth from that. But from the pipe itself you won't feel heat loss.

MS. BARROW: // How far apart are -- is each well from the plant? Is there a grid? I have never really seen a -- a design or diagram. // PH3.13

MR. SHARP: We had a diagram that showed --

MS McCLENAHAN: Want to put that slide back up?

MR. ADAMS: It is in Section 2 of the document, as well, 2.2. And it is in the handout that we handed out tonight as well. It is a schematic of the power plant.

MS. BARROW: // Some of these things were glossed over pretty rapidly and I couldn't absorb it all.

Also, I hear a lot of reference to EIR and EIS. PH3.14 I have seen it. It is about eight inches thick. It

takes a good six weeks to go through it if you are an attorney and a scientist, which I am not.

So these pipes are going to be anywhere from six inches to six feet above the ground and you don't think that that's going to have an impact on the wildlife in the area, the migration patterns of deer, cougars, black bear?

PH3.15

MS. McCLENAHAN: The pipelines are generally far enough above the ground to allow animals to go underneath.

There are also what are called expansion loops that actually go up quite high. The pipelines have to be fairly high because of the snow in the area. I forget the exact height above the ground.

Ed, do you?

MR. MERRIHEW: I think we have developed about a six-foot height, I think.

MS. BARROW: My understanding was six inches to six feet.

MR. CONANT: Some of the lines, the re-injection lines, will be -- are fairly small pipe. They will be -- an animal can step over them. The deer -- they will be fairly low. But the steam lines also themselves would be high enough the deer can go under them.

MS. BARROW: Just one last thing.

Okay. It was also glossed over rapidly that there would be -- try to be a minimal amount of clearing under the transmission lines? What does "minimal" mean? I mean, every transmission line I have ever seen had almost everything cleared out underneath in case of arcing, broken cables, whatever.

PH3.16

MS. McCLENAHAN: And that is something that we looked at closely, what really needs to be cleared under the transmission lines.

Hub, do you want to mention what you were saying this morning?

MR. ADAMS: Yeah. Basically, we, the steering committee, really, with Calpine, crushed components to really define the type of vegetation clearance that would be required and to minimize that type of -- that type of clearance.

The -- the -- I will just point to this graphic very quickly.

This area obviously here covers quite a distance, and there are different types of vegetation in the area, got a plateau area, got a highland area. These documents we are talking about we have kind of divided into three -- three areas: the plateau area, the highlands, and the transmission area, where the trees aren't quite as tall and dense as they are up in the highlands. You are definitely not down to the scrubbrush

that you are in the plateau.

This area down here, there is really not going to be much done for transmission lines. The line can be routed to avoid any significant stands of trees. There may be some topping of taller trees that are adjacent to the line.

The reasons why this clearance needs to occur, obviously, is for safety for the line so you don't have a tree coming down over onto the line and causing a fire or a shortage or something like that. And as you move higher up and the trees get denser, there is different types of clearance that will need to occur.

As Laurie mentioned, it's a hundred twenty-five foot corridor. It's kind of set as the boundaries for any type of vegetation, modification, or clearance.

In the highlands, what you are going basically going to be faced with is a hundred-foot wide corridor that will be cleared. It will be revegetated, even during the operational phase, with low-growing shrubs and other type of vegetation, which obviously are not the same as trees, but it is revegetation.

And the edges will be feathered back and tapered so you don't have a bare swath, if you will, a hundred twenty-five foot wide that is visible for miles and miles.

As you move down into the transition area, that

corridor of actual clearance can be narrowed, because the tree height isn't as high and doesn't pose as great a threat to the transmission line. So there has been an effort to minimize that.

And there is also, in areas of more sensitive vegetation, such as Laurie mentioned, late seral trees or snags that are valuable for wildlife.

The project sponsor, Calpine, will be required to buy compensation for those effects in accordance with the Northwest Forest Plan. So it's kind of brief, but kind of long.

MS. McCLENAHAN: The goal was not to have a hundred and twenty-five foot bare earth swath.

MR. PAINTER: I am Rob Painter.

And this is -- I would like to have this as Exhibit A. // This is out of the caldera, and this is a lodgepole tree. And this tree is -- was cut right at the ground, that slab, and that tree is 75 years old. So our trees up there, we don't -- they don't grow very fast. And it is seven inches across. And I suppose old growth probably gets into the 200 year, is what they consider old growth. I don't know what -- what the Forest Service says old growth is.

This is an idea of a tree when it is cut. I don't think there is anybody in here that is 75 years old. Maybe, but that's how long it takes to grow a tree

PH3.17

up there this size.

Thank you.

MR. SHARP: Yes, ma'am?

MS. WILLEY: A couple of questions.

MR. SHARP: Your name, please.

MS. WILLEY: Brenda Willey.

The hydrogen sulfide that is released, if it is mixed in the atmosphere, does that basically make acid rain?

PH3.18

MR. SHARP: I am not an air quality specialist on that. Dave Suder is the air quality specialist that did the analysis on that. I think there's two questions being asked, the amount of hydrogen sulfide released, that which is released, is there to be --

MR. SUDER: Actually, it is a long chemical route to go from hydrogen sulfide to sulfate, which is the required precursor to acid rain, but it is not expected to contribute to acid rain.

MS. WILLEY: Another question. How are the tailings from the well drilling going to be dealt with and what kind of quantity are we talking about?

PH3.19

MR. SHARP: Are you talking about cuttings then? The cuttings, the actual boring of the hole and the cuttings?

Ed or Joe?

Joe is the geologist from Calpine.

MR. BEALL: Yeah. The drill cuttings are contained in a pit during the drilling. We test that material to see if there is anything toxic in it. And if it is not toxic, then it is simply ground-up rock. It the same material that's in your driveway or on the ground normally anyhow, volcanic rock fragments.

And if it contains nothing that shouldn't be there in the surface, then normally the material is simply dried and kept on location.

MS. WILLEY: In piles?

MR. BEALL: No, no. It is smoothed out. Because it is essentially a sand layer in what was the pit. The pit volume is reduced by the volume of cuttings that are added to it.

MS. WILLEY: What if it does contain contaminated material?

PH3.20

MR. BEALL: If it does contain anything that is hazardous or toxic, it has to be trucked off to the hazardous or toxic waste disposal site. But that is out of my realm. Ed knows where these things go. All I can say is it is highly unusual for this to happen, because, again, what comes out of -- what comes out in the way of solid material is simply broken-up rock. The waters that produce it is another matter. The waters produce something you wouldn't want to put on vegetables or eat. So those materials are kept totally isolated from any

ground water system.

And there is a great effort extended to make sure that that material goes back into the reservoir where it came from, back into the subsurface where it was produced.

MS. WILLEY: //How are the pits created and how big are those that contain the ground rock? // PH3.21

MR. BEALL: We generally operate with very small pits.

Do you know the dimensions on those?

MR. CONANT: On each drill pad, two holes in the ground. If you -- one is the cutting pit and one is the -- or actual cutting storage pit, rather small, probably a little larger than this room. I don't remember the exact dimensions.

Have you got the dimensions with you?

MR. MERRIHEW: I will take care of this, if you want.

There is two sumps. One is for liquid holding. It is lined, it's -- if the one you are asking about is holding the dried, washed cuttings, I think it was about 50 feet by 50 feet. Is that right?

MR. CONANT: Yep. Probably twice the size of this room.

MR. MERRIHEW: Six feet deep. The liquid holding sump is a lot larger. It will only hold the

liquid that is produced, and then that liquid is re-injected into the resource or into the reservoir.

MS. WILLEY: How big is that?

MR. MERRIHEW: I believe that, if I remember right, that is about 750 to a million gallon capacity.

MS. McCLENAHAN: This is all addressed in Chapter 2, as well, by the way.

MR. SHARP: Another question?

Right there.

MR. FACCHIN: Phil Facchin, F-A-C-C-H-I-N.

//Going back to your clearcut operation on your power line, I believe that you said you are not going to clearcut it underneath for 125 feet? Is that what you said? // PH3.22

MS. McCLENAHAN: Right. Right. The corridor is 125 feet. In some areas, a hundred feet will need to be completely cleared. On the other 25 feet, it will be selective removal of trees that pose a risk or taking off small portions of tall trees.

MS. PAINTER: // So is it a hundred-foot clearcut? // PH3.23

MS. McCLENAHAN: In -- what was it? In the highlands area, a hundred feet will be cut because of the size of the trees. When you get down to the transition area and the clearing can be reduced because the trees aren't as high.

MS. PAINTER: // How many miles of clearcut at a hundred and twenty-five foot right-of-way are we looking at? // PH3.24

MR. SHARP: Okay. The number of acres --

MS. McCLENAHAN: That's described as vegetation.

MR. SHARP: There will be -- any vegetation that would not interfere with that conductor as it goes through there would not be removed. If there are smaller trees, six feet, seven feet, they would not be removed, similar to what we have done on the California-Oregon transmission lines down in here. This corridor, which is the Burney route farther up north in here, did the old, classic clearcut, down to bare earth swath, take everything out of the way. That has been unacceptable. I need a --

MR. FACCHIN: // Back to demobilization, Calpine is going to have to take it all apart, right? // PH3.25

MR. SHARP: On the decommissioning, yeah.

MR. FACCHIN: // You guys are going to get a deposit of a sizable amount to ensure them they are going to do this, or going to hope at the end of the period they have the money to do it? // PH3.26

MR. SHARP: I think there is a national bond that Calpine Corporation has. I don't know what that amount is.

One more question.

MR. FACCHIN: Are you the Bonneville lady?

MS. FISCHER: I am the Bonneville lady.

MR. FACCHIN: // You said that you haven't decided whether you're going to buy the power? // PH3.27

MS. FISCHER: Bonneville has not decided, no. We must go through this environmental process before we can make a decision.

MR. FACCHIN: // What does that matter? Either you want the power or you don't want the power. // PH3.28

MS. FISCHER: We would like to buy some geothermal power.

MR. FACCHIN: // Why can't you guys strike a deal, it is a done deal? // PH3.29

MS. FISCHER: Because it is against the law for us to do that, for one. We must go through the Aneka process. We must consider the environmental process in any of our decisions. And we may find that the environmental impacts are greater than we feel are acceptable to purchase the power. We don't know until we are through the process.

MR. SHARP: Ma'am? Name?

MS. WILLEY: // Well, I wanted to ask you why you want to buy geothermal. // PH3.30

MS. FISCHER: Well, that is a good question. Because Bonneville has gone through a lot of analysis of

different energy resources, energy-producing resources, and geothermal shows that based on -- compared to other conventional resources, there is actually less environmental impacts. It is a renewable resource, too. So we would like to test the ability of a geothermal resource to provide economical and environmentally acceptable energy. We don't have any geothermal portfolio at this point. And we would like to see, is this the type of energy that would work for the future? We don't know. We haven't used it. That's why we are looking at it.

MS. PAINTER: // According to the California Energy Commission, geothermal is second to nuclear in cost to produce. Why, when there is hydro and natural gas, would you ever consider geothermal? Cost-wise, it can't be cost efficient. // PH3.31

MS. FISCHER: It isn't cost-competitive, no. It is more expensive than the conventional resources. And that is why this is a test for Bonneville, to see, could it become more cost-competitive if certain things happen?

MS. PAINTER: // According to Calpine -- I have a paper here -- it says that natural gas is going to be the fuel for the 21st century and they consider geothermal an important and profitable market nitch for Calpine. I don't think Medicine Lake can afford to be a nitch for PH3.32

Calpine.

I would like to know who the investors are for Calpine. Who -- who are Calpine's investors?

MR. SHARP: Ed?

MR. MERRIHEW: Well, the attorney -- I don't know how to answer that. It's a public-offered company. Whoever buys the stock is the owner. I don't know -- have no idea how to answer that.

MS. PAINTER: // Do you have foreign investors? // PH3.33

MR. MERRIHEW: Well, it is listed on the New York Stock Exchange. You can buy it and I can buy it. It is open to the public. I'm sorry. I don't know how to answer your question.

MS. WILLEY: Well, I would like to make a comment.

Brenda Willey again.

If it were having such significant impacts on potential and current recreational uses, perhaps you could say the environmental issues were less of an impact. But in this particular area, I don't think there is any way to mitigate slow-growing trees being clearcut, cultural cites being devastated for their traditional use. There is no mitigation. It goes on and on and on. PH3.34

The environmental and cultural and human impacts in that area are significant, and I don't think there is a mitigation that can -- I don't see how it is a

good trade-off.

And it is certainly -- well, I don't think people in this county who are going to be significantly impacted by it are going to be getting a good trade-off. I think we are going to be coming out very short.

MR. SHARP: Thank you.

Yes, ma'am?

MS. FACCHIN: Marina Facchin, F-A-C-C-H-I-N.

I have two questions. One is, we are sending in public comments and stuff. Will any of that be published? Will we see the result of how many people voted "no" against it? Will there be information given back to us as to what our comments have accomplished or anything?

PH3.35

MR. SHARP: Yes. Those will be included in the Final Environmental Impact Statement. And there will be a specific appendix attached to that document. It will have the actual submittal and a then response to that submittal.

MS. FACCHIN: The other question is, this is the Proposed Draft Environmental Impact Statement. If the Medicine Lake homeowners wanted to purchase one, what would be the cost? There is a lot of good information that is not in the packets that we are getting.

PH3.36

MR. SHARP: If you give us your name, we can send them to you. If you ask for -- if an individual is

asking for additional copies, we are --

MS. FACCHIN: The Medicine Lake Homeowners Association would like at least one copy.

PH3.37

MR. FACCHIN: More than that.

MR. SHARP: I can get -- We can send more out.

MS. FACCHIN: Okay.

MR. SHARP: Yes.

MS. PLANK: Carole Plank.

A lot of people in the Medicine Lake Homeowners Association did not receive those books. There are lots of them that did not receive those books.

PH3.38

MR. SHARP: We sent to those who responded to the scoping and submitted comments on them, but we have -- we have gone through our third printing and we are probably anticipating a fourth printing.

MS. McCLENAHAN: To describe how the process went, to elaborate a little bit on what Randy did, we sent out 750 letters describing this project as coming up and asking people to send something back in if they were interested in participating. So anybody that sent anything back saying they were either interested in the project or requesting a document, they all received copies.

And the way -- all you have to do is notify Randy that you want a copy. And as he said, they have to charge for additional copies. I think it is something

over $50. So individuals can request a copy, but there was an effort to contact everyone.

MR. SHARP: Yes, ma'am.

MS. THOMPSON: Louise Thompson, from Mt. Shasta.

You say there's going to be hydrogen sulfide and sulfur oxide emissions. And I have heard it is going to put it out at nights and you say you can't smell them. But it is still there. How is this going to affect the birds and the wildlife up there?

We have -- every day we see this osprey. It is a pair, and they have got a young one with them now. So there is a nesting site right within a couple of hundred feet of the lake.

There is an eagle that is nesting up there and has a mate and offspring. There is a Great Blue heron that's there.

These birds are not going to stick around if there is going to be hazardous stuff floating around there. They are going to go elsewhere. So it's going to ruin our birding up there. How do you answer that?

MR. SHARP: Laurie or Dave, do you want to discuss the hydrogen sulfide?

MR. SUDER: I think that is really more of a biology question than air quality question. The air quality analysis does provide estimates of what the

PH3.39

concentration of all the pollutants would be. I believe that -- the biologists look at that? I don't --

MS. McCLENAHAN: Yeah. Basically, the process was to look at what are the emissions coming out of the power plant and then not only what are the emissions, but then David was responsible for doing the computer modeling to figure how would those emissions disperse.

As part of the analysis for both vegetation and wildlife and water quality, we looked at what's going to be emitted into the air? What are the concentrations at various points in the area? How will it affect wildlife, birds -- in fact, one of the sensitive receptors was a goshawk nest.

So we looked at, what are the concentrations at specific areas? And then the wildlife biologist compared those to known threshholds.

Again, the emissions are really pretty low. Geothermal is different from other conventional technologies in that you don't have the same level of pollutants as you do from fossil fuels, but that was looked at.

We also looked at -- for the emissions that come out of the power plant, what will fall on the vegetation? We looked at the levels that would fall and where it would fall, and then, is there an effect on wildlife as well, from not only direct deposition,

concentrations in the air, but also on consuming vegetation.

MS. THOMPSON: You say "you looked at it" and you say "you looked at it." And suppose that you found negative results. Does that hamper your continuance of the project or just skip it and say, "We looked at it"?

MS. McCLENAHAN: I can expand on the term "look." I am sorry. I perhaps used a little shorthand there.

The wildlife biologists and the botanists both compared the deposition levels that were predicted from the power plant and well testing. And they compared the levels with scientific studies that document threshholds of acceptability to wildlife and vegetation and found that those threshholds -- the emissions and the concentrations are well below the threshholds.

We disclosed everything that we found in the document. You can find that in "Vegetation and Wildlife."

MS. THOMPSON: In that big document, in that big, thick document, is that what you are talking about?

MR. SHARP: Yes.

MS. McCLENAHAN: Pardon me?

MS. THOMPSON: You disclosed all this in that big, thick document? All you have to do is find out where you put it.

MS. McCLENAHAN: For those issues, you can look at air quality for the concentrations. And it is also addressed in "Vegetation and Wildlife."

MS. THOMPSON: Okay. Thank you.

I have another question.

MR. SUDER: Can I add one thing to what I said earlier?

You mentioned sulfur oxide in your previous question. I wanted to point out, after the power plant was constructed -- the plant does not emit sulfur oxide after it is built. The only source of sulfur oxide is the equipment we use to build the power plant. And in the event of downtime, there is a backup generator plant that would operate only during the time the generator --

MS. THOMPSON: I have a question.

Have you considered the long-term effects of recreation at Medicine Lake, following up on Brenda's -- there are a lot of campers. There are hunters up there. This place is very much used. Does this balance with the power development that we are going to get? PH3.40

I mean, just look at Lake Tahoe after 30, 40 years of development. It's totally ruined, so much so that Clinton and Gore went a couple of weeks ago to a summit there to discuss what can be done. We have taken and ruined a jewel. And now you have got another jewel that you are going to ruin.

Can you balance the benefits of this geothermal development, no matter how much you need it, against the recreation resource? California is in dire need of places like this, a pristine place that hasn't been messed up by the usual type of construction.

When you are going to cut that big corridor, you are going to build those roads in, you can't just snake a little road in. You have got to clear everything. And it totally ruins the area.

PH3.41

MS. FISCHER: And I guess what I want to say about that is that's why we are going through this process. That's what the environmental review process is all about, so federal and state agencies, if they're making a decision on something, they know -- they know what the impacts are.

In the past, the government came in and just did stuff and they didn't know what the impacts are. That doesn't mean the government may decide not to do the project. They may decide to go ahead and do it. They will balance -- the decision-makers will balance what they know about the environmental impacts and what they know about their need. But this is -- this is where the information comes to the decision-makers. And this is how they get it.

So that's why it is really, really great that you folks are here, letting your concerns be known. This

is the way federal people get to hear them.

MS. THOMPSON: One last thing. You said that's a renewable resource. You mean this geothermal thing is going to renew itself? How? There is just so much down there, 10,000 feet down. How is it going to renew itself? That is your statement.

PH3.42

MS. FISCHER: It is considered a renewable resource. But, as far as I understand, there may be an end to it. I don't really --

MS. THOMPSON: Then why do you say it is a renewable resource?

PH3.43

MS. FISCHER: It is considered a renewable resource in the energy world.

MS. McCLENAHAN: And the concept being that the amount of -- we should point out that the amount of fluid removed from the geothermal reservoir is about 70 to 80 percent. Seventy to 80 percent is returned back to the reservoirs so the net mass loss is 20 to 30 percent. And with that return to the reservoir, that helps to renew the resource.

There are two components, the heat and the water. And so it is also considered that there is slow recharge by very slow, deep ground water movement, and that's why it has been considered renewable.

Did I get that right, Ed?

MR. MERRIHEW: Yes.

MS. PLANK: //And just in glancing at the report, it shows like under "Water Quality Studies," that these studies have been done in 1980, '81, '82. You are talking about 14, 15 years ago. And could the Medicine Lake area be more fragile now than it was 15 years ago? I mean, we are not -- it doesn't sound like we are making all these studies. This is old information gathered years ago. //

PH3.44

MR. SHARP: We did use existing information. There was additional samples done of the surface water and ground water associated with this.

MR. SHOTT: Jim Shott.

I would like to ask the air pollution control guy here with his back to me -- yeah.

Okay.// There is a state standard for the sulfides in the air, right?//

PH3.45

MR. GRIFFIN: Yes.

MR. SHOTT: Okay.// And it is known that in volcanic areas, there is sulfite in the air from this being in a volcanic area, correct, as a rule?//

PH3.46

MR. GRIFFIN: In some resources, yes.

MR. SHOTT: Okay. How would I put this? // Is the production and natural going to meet the same criteria, or is production going to get a different leeway?// Do you understand what I am trying to ask here?

PH3.47

MR. GRIFFIN: Well, I think where we are going

here is, are we going to exceed the acceptable levels?

MR. SHOTT: Correct. With natural production.

MR. GRIFFIN: The background levels are considered to be quite low and the resources considered to be quite benign. With the --

THE REPORTER: I am sorry?

MR. GRIFFIN: With the abatement, the control measures that are used for the plant, it is expected that the emissions from the plant will be well below the state ambient air quality standard so we don't expect any significant effect from NH2S emissions.

MR. SHOTT: Go ahead.

MR. PAINTER: Rob Painter.

Well, like the smell comes off the paper plants up through Oregon, Montana, and whatnot. Now, that is considered an acceptable level. Say if one of those paper plants was in California? I mean -- you know, I mean, you know, you say that this is acceptable. Well, how bad will it smell?

PH3.48

MR. SHARP: Pat, you want to --

MR. GRIFFIN: I really can't answer that because I don't know all of the constituents that are involved in the paper plants. There may be something other than hydrogen sulfide.

David, can you expand on that?

MR. SUDER: Generally, the compounds you smell

at paper mills are reduced sulfur compounds. Those are not generally constituents in geothermal resources and not expected to be present here.

MR. PAINTER: Like those smells, they don't consider that they will hurt you, but they are just offensive to people smelling them, I suppose.

PH3.49

MR. SUDER: Well, most California air districts have odor nuisance regulations, and I believe Siskiyou does as well; is that right?

MR. GRIFFIN: We have a nuisance regulation, not all many specific odor regulations.

MR. PAINTER: For hog farms and such or --

(Laughter)

MR. SUDER: I don't know what else I can provide for you. Does that answer your question? There are different compounds.

MR. PAINTER: Thank you very much.

MR. SHOTT: Yeah. Jim Shott.

In the EIS/EIR, it states that these that do go into the air will be trapped by precipitation and land back into the lake and be flushed into the lake from the surrounding snow. And it also states in the EIS/EIR that it will be trapped in the top two feet of water.

PH3.50

And my biggest concern there is that is where the fish feed, the eagles feed on the fish. That is where people swim.

MS. McCLENAHAN: Can I clarify that?

That analysis was sort of a modeling exercise. And the top two feet -- we tried to make really conservative assumptions to look at what the absolute worst case. That hydrology analysis is really an example of worst case maybe gone too far.

The analysis was to take the concentration of what could the air constituents that could be over Medicine Lake, the water basin, and made some really all-encompassing impossible assumptions that all of the constituents would come down, it would all end up in the lake. And for the top two feet, it is not at all going to be in the top two feet. That was simply an assumption to see what would happen if it stayed in the top two feet; again, to do a worst case, because the dynamics of lakes are very complex. There is a lot of mixing with the different changes in temperature, with inflow, outflow.

And so the top two-feet discussion is only to try and simplify the analysis and see what would the effect be if indeed it could be physically possible, which it isn't, for the constituents to stay in the top two feet. And the analysis showed that, even if that happened, with all of the other conservative assumptions, that the levels would not exceed any threshholds of concern for swimming, fish, water quality.

Does that clarify that?

MR. SHOTT: I just feel like a model -- well, that's all right. Thank you.

MS. McCLENAHAN: We don't expect constituents to be constrained to the top two feet.

MR. SHARP: Get the gentleman right here.

MR. HICKERSON: My name is Robert Hickerson. And I have about five questions and I am going to have a statement to make -- or at least I want to say something about the project.

The first question I have is what would the cost be over the life of the project per kilowatt hour? PH3.51

MR. MERRIHEW: I don't know the answer to that.

MR. HICKERSON: Okay. The second question is, I understand they are actually a proposal for six plants, each under 50 megawatts apiece in that area. And I would like to know if that is true. PH3.52

MR. SHARP: All I know is that we have another proposal submitted by Cal Energy Corporation for a 49-megawatt plant in the telephone flat. There is some discussion of a geothermal power plant in the Mt. Hoffman area, right in here. It is only conceptual. And that's all I'll know about it.

MR. HICKERSON: I was told today that there -- that is, they expected to build six plants of this PH3.53

magnitude, which is just under 50 megawatts. And the reason why they are limited to 50 megawatts is because if they go higher, they get into a regulatory agency that may look a little less favorable upon the project.

Can anybody comment on that?

MR. SHARP: Yes. At 50 megawatts, under State of California regulations, the California Energy Commission has approval authority. It is not approval authority from the local Siskiyou County or the local jurisdiction. That approval authority then goes to the California Energy Commission.

MS. WILLEY: Over 50?

MR. SHARP: Over 50. Fifty or above, I think, is the threshhold.

MS. McCLENAHAN: The 50-megawatt threshhold is where the Energy Commission is involved. And over 50 megawatts, they would need a small power plant exception. The difference between the NEPA and CEQA process at this level and the Energy Commission is that the Energy Commission process is a more -- what's the word? They use attorneys and it's a somewhat different process that overlaps and duplicates the NEPA-CEQA process. They follow similar processes but there are a lot more legal proceedings.

MR. HICKERSON: Well, following up on that, I spent the afternoon at the KNF. Apparently I was the

only one that went over there.

MR. SHARP: The where?

MR. HICKERSON: The Klamath National Forest. And I went through that document. // It appears that it is estimated that there is about 500 megawatts of geothermal power there. That's what I read in that document. //

PH3.54

Can anybody comment on that?

MS. McCLENAHAN: Yeah. We tried to qualify that in that document. What we did in the setting is to describe existing information about the resource. The 500 megawatts is an estimate that USGS made back in the late '70s, early '80s. It was a program in the geothermal office of USGS where geologists went around, did some brief field work, just looked at the rocks, maybe did some chemical sampling, maybe not. And they came up with an estimate. There was no wells drilled, basically only field reconnaissance. And they came up with a number.

MR. HICKERSON: Okay. // So if you did develop the 500 megawatts, you would essentially have ten plants of this size, right? //

PH3.55

MS. McCLENAHAN: 500 megawatts, you could do ten plants of 50 megawatts.

But let me back up about the 500 megawatts. Describing that, how that 500 megawatts came up, we then go on to say that there is new information based on wells

that have actually been drilled, touched the resource. And the estimate -- I don't have an exact number, but based on the people that have done the drilling, it seems like the estimate is less than 500 megawatts.

Would the Cal Energy representative comment on that or Calpine?

MR. McCLAIN: I am not at liberty to talk about this --

MR. SHARP: Let me have your name, please.

MR. McCLAIN: My name is David McClain. I am consultant to Cal Energy. I can't disclose confidential information that I may have at this time. It doesn't belong to me. I am legally bound -- I cannot disclose it because my client is not here.

MR. SHARP: Joe Beall?

MR. BEALL: The -- of the wells that have been drilled, the wells that have been drilled to test the resource, a couple of those wells have been declared productive by the Bureau of Land Management.

And the definition says they will produce geothermal fluids in paying quantities. And they have a lot of latitude to assess what that means. Sometimes if the government says this well will produce in paying quantities, that's how they see it. But we might look at that same well and say, no, it's -- it's not adequate.

As far as the ultimate capacity of the

geothermal reservoir in the Medicine Lake area, nobody knows. There have been three wells drilled in an area that is probably in a productive area that could be as large as 30 square miles or very much smaller than that. So there would have to be a lot of exploration and developmental drilling done before anybody is ever going to have a good upper limit on what the reservoir might be.

MR. SHARP: Okay. Finish off on your questions.

MR. HICKERSON: Okay. It is estimated that the life of the project is 45 years. And is that simply because they have run out of water or they have run out of geothermal heat? PH3.56

MS. McCLENAHAN: They have run out of contract.

(Laughter)

Seriously, the 45 years is based on the contracts. That is what defined the life of the project.

MR. HICKERSON: Would the resource still be there and be able to be utilized beyond the 45 years? PH3.57

MS. McCLENAHAN: I believe that is the goal of the BLM is to have -- and of Calpine to manage the resource so that it does last beyond the 45 years. Again, 45 years is a contract term.

MR. HICKERSON: Okay. A couple of more

questions.

Do you expect to spread any herbicides under the power line? PH3.58

MR. SHARP: No.

MR. HICKERSON: Okay. The final question -- and then I want to talk a little bit -- can or does the BPA wield any power into Yreka? PH3.59

MS. FISCHER: Do they?

MR. HICKERSON: Is it possible to reroute power from this project back into Siskiyou County? PH3.60

MS. FISCHER: Well, I am sure there is ways to do it. And I don't know if Bonneville has lines coming into Yreka. But there is lines that come into Yreka and power could be routed somehow through those.

MR. HICKERSON: All right. I have been studying for last 27 or nine years the life expectancy of industrial civilization. And I am not the only one that has done that. But industrial civilization looks like a little blip, goes up here and then goes back down.

The reason it goes down is that industrial civilization is completely dependent upon the energy per person. And the planet is now on the downhill side of the fossil fuel. Essentially, the fossil fuels will be gone by the year 2040. PH3.61

So I would urge Siskiyou County Planning and everybody else to ensure themselves that they have got at

least 45 megawatts of power that they can restrict to Siskiyou County because these people here are going to need that electricity in the future. And I have two research papers, if anybody is interested, that essentially speaks to what I have just said.

Thank you.

MR. SHARP: You had a question. Your name, please?

MS. PLANK: Carole Plank.

Dave --

MR. SHARP: Mr. McClain.

MS. PLANK: Dave, the day we went on the geothermal thermal trip and we went out on the sites --

MR. McCLAIN: Yes.

MS. PLANK: -- and we were on the Cal Energy site. You, quote-unquote, said "units." When I questioned about units, you told me it could be more than one power plant. It meant plants.

MR. McCLAIN: My name is David McClain. And I am with McClain Associates, consultants with Cal Energy.

As I recall the question in context, we were talking about the potential for additional capacity in the area. Power plants are built in modular units. Geothermal projects are built in modular units, 25, 48, 50 megawatt sizes.

So, therefore, they can be expanded very

readily by adding a second unit right next to the original unit. The thermal capacity of the highlands, the thermal capacity of a volcano is quite large. 500 megawatts or 350 megawatts seems reasonable to me that there is additional capacity in the volcano to be utilized beyond the initial projects.

And the point we were talking about was that there is a larger thermal capacity than there is a planned development. There could be additional units in the future. But those would have to be subject to additional environmental reviews.

And as I understand right now, Cal Energy has no plans for Unit 2 at this time. Okay? They are not proposing Unit 2 at this time. They have Unit 1 and that's all that is on their drawing board.

MR. HICKERSON: Robert Hickerson again.

It raises the question: // Is the transmission line that you say you are going to put in ten plants, is the transmission line going to have sufficient capacity to carry the 500 megawatts instead of the roughly 50? // PH3.62

MR. SHARP: Ed, can you answer that?

MR. MERRIHEW: The design criteria established for the transmission line is 300-megawatt capacity.

MR. HICKERSON: Okay.

MR. MERRIHEW: And that takes into consideration a reasonable, foreseeable, future potential

development that may occur out there that we had to design this to carry. Our plant right now, as we are going through this process, is for 49, call it 50 megawatts.

The design for the transmission lines is 300-megawatt capacity. That is not to say we have designs to build 300 megawatts, but it is there. And we were basically in concert with the federal agencies, told that's what we had to design for. We couldn't just build this thing for just 50.

MR. HICKERSON: Okay. Which would imply six plants total to be carried by the transmission lines, the possibility of being six plants? PH3.63

MR. SHARP: Yes. I am sorry.

MR. FACCHIN: Randy, how many leases have you given all these people up there in this area? PH3.64

MR. SHARP: The actual number of leases in there? I can't state the number of leases.

MR. FACCHIN: More than you can remember?

MS. McCLENAHAN: It is in Chapter 1.

MR. SHARP: Probably 15 at least.

Cal Energy and Calpine are the primary operators-owners of the leases up there. I don't know if there is another interest in there.

Do you know of any other interest between Cal Energy and Calpine?

MR. FACCHIN: Once they get the first plant in, then they will be able to go ahead and develop the rest of the area? PH3.65

MR. SHARP: A lot of it will be market-driven.

MS. WILLEY: So we ought to stop it right now. It is totally unacceptable, even one. PH3.66

MR. FACCHIN: I am still, please -- on the road closure we have got there up there, why do we have that?

MR. SHARP: I don't know. I can't respond to that. That is sort of out of the scope of this discussion, but maybe Jim or -- Jim or Brad, as resource officers, from the respective districts could respond to that.

MR. FACCHIN: Why do you have the road closed?

PARTICIPANT: The road closures are due primarily to increased cost in road maintenance and less travel, and provide roadless hunting experiences and also to reduce, to a lesser degree, that impact on wildlife, primarily deer.

MR. FACCHIN: And the environment, right?

Then we go in and put plants in there. We can't go up there and drive down the road for six months out of the year.

PARTICIPANT: Access is discussed in the EIS. We would limit access and identify routes --

MR. FACCHIN: I have one more question for you, the lady up there.

You have said that we are going to have a little, tiny cloud over there we are going to look at.

MS. McCLENAHAN: I don't think I used the terms "little" or "small."

MR. FACCHIN: You said "small cloud."

MS. McCLENAHAN: There will be a cloud. The size will depend on the ambient conditions. When it is hot and dry like it was today, you may not see the steam plume at all. But on a cold fall or spring morning, you could see a cloud that goes up 500 feet.

MR. FACCHIN: Yeah. Have you went up -- now, the emissions that come out of that pipe, right, what if they were to come directly down on a certain area?

MS. McCLENAHAN: The emissions of the well --

MR. FACCHIN: Come right down.

MS. McCLENAHAN: The geothermal fluids come up at break pressure. They are going up.

MR. FACCHIN: There are emissions coming out in the air?

MS. McCLENAHAN: The steam cloud goes up. Basically, the steam goes up into the atmosphere. And the fluid, the hot water, is directed into the sump that was described in the EIR.

MR. FACCHIN: Right. Steam has got some of

these chemicals people are talking about. Whatever you call them.

MS. McCLENAHAN: Right.

MR. FACCHIN: Okay. Then that is going to come right back down on the ground.

MS. McCLENAHAN: Well, it depends on the ambient temperature. It depends on the wind.

MR. FACCHIN: // I have been to plywood plants in Klamath Falls in January. There are clouds of those little pill balls. Stop by and eat a couple and see what they taste like. I am dead serious. PH3.67

What we are going to have up there when we have ten or 15 big mushroom clouds? //

MS. McCLENAHAN: Have you had hail clouds --

MR. FACCHIN: // Go right over to Klamath Falls and the pulp plant, that steam creates hail. // PH3.68

MR. CONANT: It depends on the loading of what's in the steam, what constituents or what pollutants are in the steam or vapor, water vapor, coming out of the cooling dock.

For one, the bulk over the life of plant, we are talking about vapor.

The cooling tower, which she is talking about, the small steam plume that you are going to see from the cooling tower.

MR. FACCHIN: // Going to be small, though? PH3.69

How big is it going to be in the winter? Going to look like up in Klamath Falls and settles down on the whole area, looks like hell.

MR. SHARP: Cold winter day going to be a nice hot rise and get a very -- it is going to punch it through.

You are talking about Klamath Falls, probably. I haven't seen it. I have seen other places. You get a conversion layer. David could probably address --

MR. FACCIN: Are we going to have that same situation there?

MR. SUDER: I believe there's a reference to quantitative analysis done for similar sites but not specifically for this site.

MR. FACCHIN: Randy, don't you think they should do it for this site?

MR. SHARP: It is a good point.

MR. FACCHIN: One other thing, this pipe you are putting in, are bullets going to go through similar type lines? I have never seen a bullet puncture. The problem you have is you have got around three eighths pipe, round. The bullet is going to hit it and show --

PH3.70

MR. FACCHIN: You haven't been up here when the people from the city are up here.

(Laughter)

MR. McCLAIN: Dave McClain again.

I consulted again on a geothermal project at the Clinell (phonetic) Naval Weapons Center where they test weapons, and there was a weapons test on a pipeline of a high caliber military-type weapon and it did not puncture the pipeline. It ricocheted, is actually what it did.

PARTICIPANT: It ricocheted. He will come up with an armor-piercing bullet and prove me wrong.

MR. SHARP: Thank you. We have another question.

MS. PAINTER: Jane Painter. I would like to address the air inversion problem that does exist at Medicine Lake in the wintertime. We snowmobile all the time in the winter. And in this caldera, the fog can be very, very thick during the wintertime. And we could go outside the caldera and it can be clear. So a lot of that steam plume will probably get caught in the fog and those chemicals will be held within the lake area. So that's something that has to be addressed, too.

PH3.71

There is definitely an inversion problem there in the winter.

MR. SHARP: This gentleman here back there.

PARTICIPANT: I would like to go back to square one. My dates aren't exactly right. Start drilling these test wells in 1989, et cetera. They had a whole bunch of seismographic readings of the area, one four

PH3.72

point five or five two or something. Shook the whole lake. Is there a correlation to these 10,000 foot holes and seismographic readings? Drill these holes, like letting air out of a tire, going to go flat here. It is a caldera, volcanic reaction.

What are we doing down there if we start putting all these wells down there? Going to create something -- any test on this or am I barking up a tree here or anybody know anything about this?

MR. SHARP: Joe?

MR. BEALL: Joe Beall.

We produce steam to about, oh, about 300 megawatts of power plants in the geysers in a geyser steam field which is the world's largest. There are lots of micro-earthquakes, very small. Occasionally -- occasionally there will be an earthquake of sufficient magnitude to be felt, but very -- but not very often and there are -- there are literally dozens every week that are too small to feel.

I guess the answer to that is that, yes, seismic activity can be -- can be accentuated by geothermal production but not seismic activity that affects people or property; seismic activity on a micro scale. You can't feel it, except for the very rare event. And -- and, of course, there are natural events out there anyway, so I wouldn't say you would never, ever

feel an earthquake. Anywhere in California you might.

But based on -- based on all our years of experience in the geysers where we produced literally tons of steam, or we haven't caused seismicity to -- to cause -- seismicity has not caused any kind of problem, seismicity induced by production.

MS. THOMPSON: If somebody mentioned a snowmobile trail or something would be affected, I would like to know which one it is. PH3.73

MR. SHARP: Jim, could you tell me?

PARTICIPANT: As far as accessing the site in the wintertime when snowmobiles would be present, the route we have selected was from Four Corners Snowmobile Park, designated a snowmobile route. It doesn't receive enough snow to be groomed and maintained. That is what we call railroad grade. That is the primary access road to, I think, 44 or 54, or we call it a Fourmile Hill, the hill road. It turns and goes south towards Fourmile Hill. That is not a snowmobile trail. It is only an impacted snowmobile trail. That road -- that road, before it gets to the Grouse Hill Road, which is the road that comes off this 77 road and goes towards doorknob park, it crosses that road.

And we have made mitigations and put in a crossing there. Because of goshawk concerns, it won't follow the road. They have planned to construct an

access road to access this well pad from off the Fourmile Hill Road maybe a half mile before you get to the Grouse Hill Road and then there will be a crossing there and warning. Snow will be maintained there so you can use it.

MS. THOMPSON: You were saying you thought there were 15 leases given out. I happen to know you came to the homeowners meetings, told us 19 leases were given. I happened to drive over there to the first one that was drilled. I have pictures of it, pictures of all of this stuff. And that first well, there is a cloud visible from about eight miles away. It wasn't anything like your little -- cute, little thing you have on your picture. If you want a correct picture, I can send you a picture of that immense cloud that goes up from that well that was being drilled.

I think when you put these things out, you ought to be accurate about it.

MS. McCLENAHAN: It is discussed in more detail in the document. We do describe what you will see, how big the plume will be. That is addressed in greater detail.

MR. SHARP: Some of the leases have been relinquished since they were originally issued; companies elected not to pursue the development of the lease and relinquished the leases and they have never

PH3.74

been re-issued.

MR. FACCHIN: Randy, you guys got, I don't know, between 15, 20 leases, whatever. Have you put all these on paper?

PH3.75

MR. SHARP: Yes.

MR. FACCHIN: This is a mess we are going to have when all of this is done. When you let these people in there, it is over. Going to get all of them, more transmission lines, the whole damn thing. You live around here, don't you?

PH3.76

MR. SHARP: I live in Alturas.

MR. FACCHIN: Do you want it?

MR. SHARP: I don't try to involve my personal --

MR. FACCHIN: This is something here -- this is something important here. This is not politics. This is the last good area around here. You are letting these guys come in here and do this stuff. You are ruining that area.

PH3.77

MR. PAINTER: I was wondering -- I am Rob Painter.

Calpine will -- are you planning in this day and age -- I know you have made probably -- probably made big steps forward and in going into an area, but are you are planning on making the same mess you have made in the geysers?

PH3.78

I worked for PG&E in '71, '72, '73, and I worked in the geysers. Is the impact on the land going to be as bad as what it is down there?

MR. SHARP: Ed, do you want to --

MR. MERRIHEW: The best way I can answer that, the impacts we envision are in that 800-page document. I can't address what impacts you are referring to in geysers -- in the geyser setting. It is here 350 miles away.

MR. PAINTER: You haven't seen the geysers?

MR. MERRIHEW: I don't know what specific impacts this gentleman is referring to.

MR. PAINTER: Just a total mess. Power plant after power plant. It is an industrial mess, is what it is. That's all I can say.

And on your plants there, do you still have all plants in production that you have originally or have some of your plants shut down?

MR. MERRIHEW: We own and operate two power plants in the geysers. They are still operational.

MR. PAINTER: They are, huh? Do you feel like they will -- they will go to the end of the lease period -- that they will be productive until the end of your lease period on those two plants?

MR. MERRIHEW: Based on the production history --

MR. SHARP: Hold on just a minute.

Laurie?

MS. McCLENAHAN: To respond a little bit on that, I can't respond to the industrial mess, but I can say I have seen the geysers as well. The geysers, as Ed mentioned, are a unique feature, one of the largest geothermal fields in the world. It is a steam field, I think the only steam field in the U.S. And I don't think anybody is predicting that right now that Medicine Lake highlands would support anything near that. But I think the point is that it is not known for sure, because only three wells have been drilled.

PARTICIPANT: Number one, comparing geysers, this is not a reaction that volunteered to come out of the bowels of the earth. We are drilling down. You are comparing geysers with something that come up naturally. We are bringing this up manmade.

Number two, talking about not clearcutting. Only six foot. When they get ten, what do you do, drop them over the next 40 years?

You are robbing Peter to pay Paul. I don't buy that. You have to continue to drop all of these trees as soon as they get big. Don't tell me you are leaving trees. As soon as they get big enough and they pose a threat to the line, you are going to go in there and drop them.

PH3.79

MR. HICKERSON: Robert Hickerson again.

How many megawatts is the geyser?

MR. BEALL: Right now, the geyser is producing -- my recollection is that right now it is producing about 1300 megawatts.

MR. HICKERSON: // So if you are going to do three to 500 -- 500 into 1300, this is a third as big as the geysers if you do the total development? // PH3.80

MR. BEALL: I think the only development we are proposing is for 50 megawatts.

MR. HICKERSON: // There is a potential for 500 megawatts. The conclusion is that that power will be needed into the next century and it probably will be developed? // PH3.81

MR. BEALL: I don't think you can make that assumption, though. I think that's getting way ahead of ourselves.

MR. HICKERSON: There will be a demand for it.

MR. SHARP: Yes, ma'am.

MS. WILLEY: Brenda Willey.

// What cumulative effects of several power plants are included in this Fourmile EIS/EIR? // PH3.82

MR. SHARP: The cumulative effect, at least at any reasonable foreseeable project, the primary project is that of the Telephone Flat geothermal project.

MS. WILLEY: // So all the significant impacts, et PH3.83

cetera, are based on the two projects?

MR. SHARP: Correct.

Is that not correct, Laurie?

MS. WILLEY: Okay. // And I think that there ought to be a further look. I think that there ought to be a potential look at cumulative effects for the 300 possible megawatt number and see if we come up with a significant amount and whatever your other unmitigated impacts are. Because, you know, I just don't think it -- it doesn't sound reasonable to me that you are going to put in this huge transmission line that will carry 300 milliwatts -- megawatts, whatever it is, and then you are going to stop. It is like going, "Oh, you know, we've already done all this work. We have got to utilize it to its fullest." It is such an expensive resource, anyhow, to produce. PH3.84

So I think that this -- you have to look at that. //

MR. SHARP: Back there.

MS. FACCHIN: Marina Facchin.

// I am concerned right now, Medicine Lake is pitch black at night. There isn't anything to be seen except the stars and such. You are going to have this plant lit up 24 hours a day. And, you know, the light is going to travel. The noise is going to travel up there. It is going to be like this big glow over there. It is PH3.85

going to look like an industrial park at night, you know. It is not going to be a natural area anymore. It will look like an industrial park with a lake next to it.

MR. HICKERSON: Robert Hickerson again.

Yeah. I wonder how many watts of outside lighting you will have at the plant once it is operating. PH3.86

MR. SHARP: Laurie, do you know?

MS. McCLENAHAN: I can't tell you off the top of my head. But what I can tell you is individual resource analysis. We looked at both daytime conditions as well as nighttime conditions. That was identified as an issue of concern. What you are going to see at night, night lighting is an issue we addressed. There are mitigation measures defined to allow down lights to reduce that. I don't know how many megawatts off the top of my head.

MR. SHARP: Yes.

MR. FACCHIN: So in your little pictures you drew us where the power line was, you didn't do one for nighttime to show us. PH3.87

MS. McCLENAHAN: I think there is actually a night lighting simulation in the document. That is section -- no?

No. Okay. No.

MR. ADAMS: It is described in words. There are a limited number of pictures you can put in the

document.

MR. FACCHIN: I would like to know what the lady over here -- I don't know what her name was. I think you guys definitely need to look at the total picture of this thing, not just putting in one plant. They are not going to come up here to do one plant. They are going to go for the whole thing.

Don't worry about approving one. If you let one in, you are going to do the rest of it. You haven't -- you don't have nothing like that to stop it. So it is going. That -- you need to look at the whole overall picture, not just one little project. PH3.88

These guys aren't going to drill one well and get it going and go home and say, "Good." they are going to pop everyone of those leases, once they do it. These two other companies, they are going to get on the wagon. It is going to happen and we are going to have a big, old mess up there. I don't think you ought to look at these individual. You have go to look at the whole, overall.

MR. TUREK: Jerry Turek.

I have a question. I attended a class at OIT several weeks back. One of these things they're going through what Calpine's projects were and everything. One of the issues, they had no buyer for the power before the plant was constructed and probably that very day, they suddenly didn't have a buyer for that power. Then the PH3.89

gentleman next to us, telling us they can go ahead and put the plant up regardless of whether they have the power sold or not. That is not what we were told at that class.

MR. SHARP: I wasn't there.

MR. TUREK: I know. These gentlemen were.

MR. MERRIHEW: There is some confusion. I apologize. We are intending to get a buyer. I don't know where that buyer is. I am not involved in marketing. I am involved in managing the environmental affairs of this project. That is the limit of what I deal with in this company.

However, the company is interested in marketing this power before they do any construction.

What I tried to explain is that in the deregulation that is ongoing right now in this industry, you can build a plant. It is called a merchant plant. You don't have a contract. You build believing that, because of the demand for future power, you will find a power. And there are merchant plants that are being constructed. That is what I was referring to.

And, typically, they are natural gas plants. This particular project that we are here discussing today is a geothermal plant of 49.9 megawatts and Calpine is out marketing that power. We do not have a contract for it.

MS. PAINTER: Jane Painter.

Who would want to buy expensive geothermal-produced power when you can buy natural gas and hydro at such a cheaper rate? PH3.90

MR. SHARP: What I have been told by the company, they have done market surveys. There are markets. Individuals are willing to pay for, quote-unquote, environmentally clean, less impact to the ozone layer at a higher cost.

MS. PAINTER: Are they doing that to round out their portfolio so it looks like they have a rounded-out group of energies to sell to the public question mark? PH3.91

MR. SHOTT: Jim Shott.

I am sorry. Is this consumer like you and I made this statement, Randy, or is it the utility company? PH3.92

MR. SHARP: I am too frugal to pay too much. There are a people lot more wealthier than this government worker.

Kathy?

MS. FISCHER: Kathy Fischer.

I say it is not the utility companies, but it is more some environmental groups. There is, oh, Greenhouse Action, Natural Renewables, Northwest Project. There is some environment constituents out there that are really pushing utilities to purchase renewable energy power that does not emit greenhouse

gases and contribute to global warming. And that's where a lot of it is coming from.

MS. BARROW: Marcia Barrow again.

I am building up such a good head of steam here. I will volunteer to be your first plant. I could produce 49 megawatts right here and now.

(Laughter)

What I have heard all night long time and time again is, "I don't know. I am not sure about that. Refer to the book."

You know that the vast majority of people are not going to send away for an eight-inch thick book and sit down and read it and understand what is happening. And now, I think it is pretty obvious from the audience that there are a lot of people in Siskiyou County that don't want to be in Calpine's pocket for their experimental research, whatever you want to call it, and destroy our wilderness for us. PH3.93

All I hear is there is going to be minimal impact, negative impact. I don't buy that, I am sorry. I just don't buy it.

There is two of the 49. So I have got 47 left.

MR. SHARP: Thank you.

Sir?

MR. SHOTT: I have another question.

I went -- how much is Siskiyou County going to PH3.94

make on this deal? How much do they get paid?

MR. SHARP: As far as returns to the treasury, there is two sources. One is the royalties the federal government makes off the lease. That equation essentially comes back somewhere 50 to $60,000 a year. Initial assessment of property values that Siskiyou County will give to the -- will assess Calpine because of their improvements. Modoc County will, too.

Do you have those figures, Ed or Laurie? I thought they were a little over a million dollar a year. I am not quite sure on that.

MR. PAINTER: They are in the book.

PARTICIPANT: I know my property is going to go down. PH3.95

MS. McCLENAHAN: Do you want the numbers?

MR. SHARP: Approximately 1.3 million in Siskiyou County the first five years.

MR. FACCHIN: I know I am getting in late on all of these meetings. Has anybody looked to see that maybe our property values are going to go down? Instead of looking at this beautiful wilderness, a little cloud and power line and clearcut to look at? PH3.96

MS. McCLENAHAN: We looked at that issue. That is in the socio-economic analysis and the conclusion was that it would not affect property values.

MS. WILLEY: Can you justify that conclusion?

MS. McCLENAHAN: There are processes for going through and looking at what affects property values. I don't do that analysis in this document. I can't respond.

I do not want to make the point. You can't read the entire document. There is a lot of information here. But the questions you ask tonight, comments you send in writing, will be responded to in writing. You will be able to look at the next book and go to your comment letter and see the responses.

PARTICIPANT: Can we have the names and address of people and agencies that we can write to for our comments before we leave here tonight, either business cards or whatever?

MR. SHARP: On the comments, they come to me, 800 West 12th Street, Modoc National Forest, Alturas, California. The phone number --

Yes?

MS. PLANK: Excuse me. Carole Plank.

Laurie, I am a real estate salesperson working out of Mt. Shasta. I can guarantee you, our property values are going down. We are not going to be able to give the property away. PH3.97

MS. McCLENAHAN: Where is your property?

MS. PLANK: Medicine Lake.

MR. SHARP: We have some more comments.

PARTICIPANT: Make the comment, take all these books you are getting like this, it says "Medicine Lake." All these pipelines around, get the book and see what you have visually. About six books this thick and wonder what happened to this pristine area. PH3.98

MR. SHARP: Yes, ma'am?

MS. PAINTER: I am Jane Painter.

And I am concerned about the amount of water that these power plants are going to use. PH3.99 And where are they going to get this water for their construction and for road, for dust and for just all facets of this construction period? PH3.100

MS. McCLENAHAN: The water use is -- water is used for drilling and for the initial plant operation. Calpine intends to drill water wells on their leases. And they will produce water for drilling and I think domestic use, at the least.

As far as the power plant goes, the power plant does not require fresh water for use. The way the process works is that the geothermal fluids come up from the reservoir. The steam and hot water are separated. The steam goes through the turbine, and then it is condensed to water. And then it goes into the cooling tower. The cooling tower, the water that goes into --

MS. PAINTER: I am just interested in the water that is coming out of the well. PH3.101

MS. McCLENAHAN: The geothermal well?

MS. PAINTER: // No, the Arnacus (phonetic) sink well that could go up on the Medicine Lake aquifer, and how much water is going to be required for all of your road maintenance and your building? //

PH3.102

MS. McCLENAHAN: That is quantified in the hydrology section.

MS. PAINTER: I heard there was like almost a million gallons of water for drilling one well.

MR. PAINTER: 850,000 gallons. That is more than half.

MS. McCLENAHAN: It depends on how long -- there are variables that affect how much water is required for each well. But those estimates -- and again, we try to be conservative on the estimates. They are described in the hydrology section, 4.3.

MR. PAINTER: Rob Painter.

// On your hydrologist report, you have got dust control, I think, for your first segment of construction, is 10,000 gallons a day, which would be about 45 minutes of water wetting of the roads. Is all of your numbers in that like that? You are going to have run a water truck round the clock. Are all your numbers you picked as far off as that one? Ten thousand gallons a day? //

PH3.103

MS. McCLENAHAN: Tim, would you like to respond to the dust control, the water use for dust control?

MR. PAINTER: You know that 10,000 gallons is 45 minutes of road wetting?

PARTICIPANT: If you say so. One of the things we talked about the company is that probably that kind of watering would be cost prohibited and we would look at some kind of treatment, either chip sealing or some kind of dust abatement along those lines.

MR. PAINTER: // I am just getting at that some -- some of your figures and whatnot in this thing, they are so far from reality I'm just hoping that all of the whole book isn't so far from reality as this.

PH3.104

You know, you have got professionals that do this, but they seem like somebody has dropped the ball here in a few spots. //

MR. REED: Fred Reed.

As I remember, that figure is a per mile figure.

MR. PAINTER: Was it per mile?

MR. REED: Yeah.

MR. PAINTER: It said per mile. Is that per mile per day?

MR. REED: Per day per mile.

MR. SHARP: Do we have other comments?

MS. PAINTER: Jane Painter.

// How bout sewage? What are you going to do with that? //

PH3.105

MR. SHARP: Tim or --

MR. CONANT: It will go down back in the reservoir.

MS. PAINTER: You are going to pump your sewage into the well? PH3.106

MR. CONANT: It goes through a normal septic system and goes through a settling tank and then that water, the gray water is reinjected, probably handled a lot better than the sewage that comes out of the campgrounds or wherever else. It is going to go back down in the reservoir.

MR. PAINTER: Into the lower aquifir?

MR. CONANT: No, no. Out. We are breaking up three million pounds per hour of liquid and reinjecting over two million. A little bit of sewage and effluent and gray water is like a drop in the bucket.

MS. THOMPSON: How about the solid?

MR. CONANT: Solid? Same thing, going into the septic tank and digested like -- just like a septic tank at your house.

MR. PAINTER: Septic tanks aren't allowed in that area. Aren't you going to have a holding tank?

MR. CONANT: You have a tank, goes into the septic tank, totally sealed.

MR. SHARP: Yes, ma'am.

MS. THOMPSON: // I want to say I am a little PH3.107

disappointed in this meeting. I didn't have access to that big, thick book. And yet you people have been doing this three nights in a row. Surely, the same questions have come up, yet we have been told over and over, "Look at the book. Go read and the book."

I don't know. I mean, how are we to take you as experts or you as authorities when you seem to not know very much about this whole process? //

MR. SHOTT: // You are evading a lot of questions. Kind of beating around the bush with these people. I guess we are just country hicks. // PH3.108

MR. SHARP: So noted.

MS. McCLENAHAN: We have had three meetings. And if we need another meeting where the format is we respond directly to every question. This meeting is talking about the document and to respond directly to your questions in writing. This meeting would go on for two weeks if we responded to every single question and had --

PARTICIPANT: This is kind of -- kind of toward the end of it right now. In other words, there is going to be more investigation? Let's look at your little scale. They are getting real close to the end of this whole thing. A lot of decisions made, a whole --

MS. McCLENAHAN: Decisions aren't made until we receive your comments on the draft, see what questions

you have that aren't answered, respond to those questions. And then that document that responds to your questions goes back out to the public for review again, before a decision is made.

MS. BARROW: Marcia Barrow again.

So you are telling me that Calpine has dumped a few million dollars -- I don't know how many -- into drilling these test wells and they are going to listen to us?

PH3.109

PARTICIPANT: They don't even know if they have sold it yet?

MR. BEALL: I couldn't quite hear the question.

MR. SHARP: The question was -- do you want to repeat it, ma'am?

MS. BARROW: I am so steamed, I forget what I said.

I assume you have several million dollars sunk into sinking these test wells and into Environmental Impact Studies, and you are telling me that Calpine is going to listen to us, that Calpine is going to be willing to lose those millions of dollars that they already have invested?

PH3.110

MR. MERRIHEW: I think I can answer that. We are listening to you. We are here in response to that. We are here as developers. We want to develop this property. We have bought the leases. That's our

business. At the same time, we are concerned about your interests and this document reflects that, I believe, by all the mitigation measures that are in it.

MS. BARROW: So will the company be willing to accept a several million dollar loss?

PH3.111

MR. MERRIHEW: We are trying to get it developed in the best possible fashion with the best mitigation measures possible. You can't expect us to sit here and say, "Fine, we won't build it." I mean, we are in the business of developing power.

MS. BARROW: Then why have the meetings, if you are not going to listen to us?

MR. ADAMS: The decision really is with the lead agencies, not with Calpine, not really. The information should be directed at Randy, as far as --

(Laughter)

But, really, they are in a position to make a decision about this project. It is not Calpine. And your comments, your input, is going to be part of the evaluation that will be done by the agencies, whether they are going to approve or disapprove the project.

MS. FISCHER: Thanks, Hub. I am glad he said that. It is true. We are here.

MS. THOMPSON: Excuse me. I got a little bit cynical. I have just gotten 62. I have heard a lot of this through this lifetime.

MR. PAINTER: There is trees older than you.

MS. THOMPSON: But not bigger.

(Laughter)

MR. PAINTER: I am not going to comment on that.

MS. THOMPSON: Thank you.

MR. SHARP: Do we have some more comments?

MS. WILLEY: What does it take to do alternatives?

PH3.112

MR. SHARP: I am not a decision-maker on this. The forest supervisor for the Klamath and Modoc National Forest, along with the Alturas Resource Area Manager are the decision-makers. I don't know what their exact criteria are to ensure environment impacts, social impacts, cultural impacts, go into the factors and possibly selecting the no-action alternative.

MS. WILLEY: Is this in the big book, the Forest Service Supervisor of the Modoc and what?

MR. SHARP: Klamath National Forest and Alturas Resource Area, BLM area, Chapter 1, "Decisions to be Made in the Respective Agencies."

MS. THOMPSON: Instead of writing to you, whenever somebody writes to these Modoc and Klamath supervisors and this resource manager --

MR. SHARP: You could write to them, but they will see all your letters.

MS. THOMPSON: How do you tie into this anyway? Is it --

MR. SHARP: I am actually a Forest Service employee that is on shared service with BLM as a geologist. I work as a geologist for the BLM and Forest Service and environmental coordinator for the Forest Service, in a previous job and given an assignment or opportunity to coordinate the development of the environmental document.

MS. THOMPSON: You are a lucky guy.

MS. McCLENAHAN: He tells us that every day.

MR. SHARP: Yes, ma'am.

MS. BARROW: I am sorry I am coming down on you so -- Marsha Barrow again.

I am getting so upset with developers coming in and they see wilderness and all they see are dollar signs. And I guess I was naive when I moved up here. I understood that the Forest Service and BLM are supposed to manage our land, our heritage, and yet the Forest Service is constantly selling our heritage. They sell our timber. They sell our land to develop. They allow cattle to graze on Forest Service lands.

PH3.113

To me, that is not management. To me, that is not taking care of our environment, which I think is the primary purpose of the Forest Service.

MS. THOMPSON: It is to make money.

MS. McCLENAHAN: I think that is an issue for Congress.

(Laughter)

MR. SHARP: More comments?

MS. THOMPSON: That land is public land. It belongs to us. It doesn't belong to you, the resource manager, or the Forest Service or Cal Energy, anybody else. That's our land. And so we should have a say how we want our land to be developed. And we are saying we don't want that outfit up there.

PH3.114

MR. SHARP: Sir, you had a question?

MR. PETERSON: Don Peterson.

Did that company have anything to do with the power plant that is over there south of Reno, between Reno and Carson City?

MR. SHARP: Steamboat Springs?

MR. PETERSEN: Brand-new one out by Fernley, just to go on line very shortly. Has anybody from this company been to Iceland and see what they do with geothermal energy up there? The whole country is run with geothermal energy. Everybody in the land gets free hot water and heat in their house. And they got no problems with the environment, because they use what's there.

PH3.115

Look at other people and what they do with it. It is a simple solution.

This clearcutting thing -- what about that 40-inch gas line came from Canada? Going all the way from San Diego on a 125 foot swath. Up there by Burney Falls, when you drive through the highways you can see it. They didn't have any problem getting that through, did they? That's natural gas, but very much needed right now.

MR. SHARP: Very economical.

Do I feel a sense we are about done with comments for the night? If you want to say some more, I wasn't trying to cut you off.

MS. WILLEY: Where is the transmission line of alternative six in relationship to the lava beds, not wanting it to be visible from them? Is that --

MR. SHARP: What is their concerns?

MS. WILLEY: I am saying, in terms of alternative six and their concerns, right.

MR. SHARP: We had a meeting with them today. There is analysis documentation, visual simulation. Generally, topography hides the transmission line.

MS. THOMPSON: Is that acceptable for them, Randy, that alternative site? I know the Forest Service wants that.

MR. SHARP: The Forest Service does not want that.

MS. THOMPSON: They told us that.

MR. SHARP: I don't want to get into that debate.

Oh, well, there was a proposal. We looked at alternatives. I can't speak for Craig Dorman on the lava beds. And I wouldn't want to be quoted, but I sense from him he understands the impacts of putting the transmission line in the Medicine Lake area. He could see the visual impacts from here and he can note the visual impacts from there. I sense that he feels that there would be less impact, but I don't want to speak for the individual.

MR. PAINTER: I kind of think he thought if Cal Energy -- if their plant was accepted, they could pick up both them and then the total impact they thought would be less.

MS. McCLENAHAN: They will respond to the draft document in writing, so their views and their comments on the project and the document will be in the final EIS.

MS. THOMPSON: // Why would the route by Medicine Lake have ever been proposed in the past? // PH3.116

MR. MERRIHEW: I can answer that. Calpine had -- Calpine had originally talked to the Forest Service and the BLM about running a line basically from Point A to Point B and the shortest distance, and I won't say we ran directly over the top of the release, but it was further up here and further about like so.

On -- on original meetings with them, letting them know what we had proposed, so a lot of meetings and discussions, these lines basically were moved down this way and down like so to get it off the sideways. This particular spot, it is hard to tell on this map, but if I had a good topo, I could show you where we originally had it plotted like so.

There is a -- on that road as you are going up from the -- from the glass flow up to the -- up to the peak where the road quits and the gravel starts, there is no trees. That is all scrub. And you can see the line -- I will just say it is a half a mile long. I don't really know. You can see the line from anywhere down at the lake by moving further down, admittedly getting closer to the campgrounds, lake, and homeowners.

However, based on where it was, by moving it further south, it was better hid, I guess is the proper word, in the trees as opposed to running it on a side slope where it was very visible.

The same thing occurred this way from the lava bed. It high-lined certain ridges and by dropping it down further, lower, it became less visible. So that's where this ultimately came from. It was evolved from various other routes that contorted around within this frame here and wound up in these locations. That considered all of the other considerations; visual,

noise, whole bunch of other things. That's where it ultimately wound up.

MS. BARROW: Marsha Barrow.

So that little bluff spot there, that's Medicine Lake. Okay. The topographical thing, that's the glass flow?

MR. MERRIHEW: Glass flow spotted right in here. Mt. Hoffman. The caldera edge of the volcano goes something like this.

MS. BARROW: There is a flow a half mile from the lake?

MR. MERRIHEW: Right in here. Medicine Glass Flow.

MS. BARROW: That goes right through that beautiful forest.

MR. MERRIHEW: Those are some of the impacts we have disclosed in the document. That's why we do this process, to look at the impacts and disclose it. That's why we identify alternatives. That's where the environmental document says that is an environmental preferred alternative, and we are hearing a lot of comments at previous meetings, it is ludicrous to select this. That wasn't the word. That was my strangulation of it.

MS. BARROW: No. You are right, though.

(Laughter)

MR. SHARP: There is still probably some comments out there.

MR. SHOTT: It can be written.

MR. PAINTER: Did we exceed our hour and a half?

MR. SHARP: I stopped getting paid a long time ago.

MR. PAINTER: Thank you.

This is Exhibit A.

MR. SHARP: You're going to submit that?

MR. PAINTER: This is everything. This is my 75-year-old tree.

MR. SHARP: I didn't see your Forest Service violation.

More comments?

PARTICIPANT: I am just curious why there weren't any meetings in Mt. Shasta, that area? PH3.117

MR. SHARP: For this? I guess it was our feeling that the primary folks that were concerned in Mt. Shasta were the Medicine Lake homeowners and we are going to their annual meeting to discuss this. And, also, we're a few miles up the road.

PARTICIPANT: Klamath Falls is far away, too.

MR. SHARP: There was a lot of interest expressed there. We went there for scoping. We did -- there is a geothermal development in that area.

Generally, when we do scoping, we try to go to every point we feel there is going to be some issues, develop those issues, find out what those issues are.

When we do the public hearings, generally the meetings are limited.

With that, I guess we are concluded.

(Whereupon the hearing concluded at 9:35 p.m.)

* * *

State of California)
) ss
County of Siskiyou)

I, RONALD W. COLEMAN, CSR 1596, Certified Shorthand Reporter, County of Siskiyou, do hereby certify that the foregoing transcript, consisting of pages 1 through 77, is a true, complete, and correct transcription of my shorthand notes taken on August 7, 1997, in the aforementioned matter.

Executed this 27th day of August, 1997, at Yreka, California.

RONALD W. COLEMAN, CSR 1596

MEETING NOTES

Fourmile Hill Geothermal Project
Draft EIS/EIR Public Hearing
Mt. Shasta, CA
August 29, 1997

PRESENTERS:

Randy Sharp, USFS/BLM

Laurie McClenahan, MHA
Hub Adams, MHA

COMMENTS RECEIVED

Environmental Review Process

It seems as though all comments made by the public during the public hearings are just being dismissed. PH4.1

Request was made for an extension of public comment period. PH4.2

Proposed Project

Routing the transmission line along segment A1 adjacent to Medicine Lake is unacceptable. PH4.3

Project should not happen//Project is not needed//Project would permanently devastate the environment. PH4.4 PH4.5 PH4.6

Drilling impacts are considered short-term, but drilling will occur over 14 years. PH4.7

Could project be extended after 45 years? Project is a waste of time and money for only a 45-year project. PH4.8

Alternatives

EIS/EIR should consider an energy conservation alternative since that would meet the purpose and need. PH4.9

Hydrology

The project would use too much water//Concerned about the effect of water use on Medicine Lake. If the level of Medicine Lake and/or local groundwater levels drop during a drought, would groundwater pumping be stopped? PH4.10 PH4.11

The Fall River Resource Conservation District requested a study of the project effects on Fall River springs be done. Request that this study be completed before the Record of Decision is finalized. PH4.12

The analysis of hydrology in the Draft EIS/EIR is difficult to follow. PH4.13

American Indian Issues

Concerned about effects to American Indians and spiritual area//Concerned about effects on integrity of the Medicine Lake Highlands. PH4.14 PH4.15

Wildlife

Concerned about disturbance of migratory routes. PH4.16

The EIS/EIR should address the elk herd. PH4.17

Visual Quality

Concerned about visual effects. PH4.18

Land Use and Recreation

Concerned about closing areas to recreational activities, including hunting. PH4.19

The steam line should be buried to avoid interfering with snowmobiling. PH4.20

Human Health and Safety

Radon emissions and contamination should be addressed in the EIS/EIR. PH4.21

Concerned about release of arsenic, selenium, etc. from wells//Concerned about well blowouts and uncontrolled releases of materials. PH4.22 PH4.23

Cumulative Effects

The cumulative effects of the Telephone Flat project are not discussed in the document. PH4.24

Concern that the California Energy Commission is not addressing cumulative effects. PH4.25

The EIS/EIR ignores cumulative effects to Native American values in the area. The NEPA requires that cumulative effects on tribes be addressed. PH4.26

QUESTIONS ASKED BY THE PUBLIC

Environmental Review Process

What permits would be required?//Would any permits be issued before the Record of Decision on the EIS/EIR?//Is there public involvement in permit decisions? PH4.27 PH4.28 PH4.29

Are there any methods to stop the project if the permit requirements are violated? PH4.30

What other regulations relate to geothermal production? PH4.31

Why has the Medicine Lake Homeowner's Association Freedom of Information Act request not be filled? PH4.32

Who represented the California Department of Fish and Game in this process? PH4.33

Proposed Project

What's going to happen during the reclamation phase? Is there a reclamation plan? PH4.34

How large will the area of restricted access be? PH4.35

What would be stored in the sumps? Who would monitor the sumps for leaks? | PH4.36 PH4.37

How many miles of access roads would be constructed? | PH4.38

Does the proposed project include use of radioactive isotopes? | PH4.39

Power Sales and Agreement

Who would be the primary receiver of energy? What percent would serve the local counties and Medicine Lake area? | PH4.40 PH4.41

Geology

What if a pocket of magma is hit during drilling? | PH4.42

Hydrology

What will the effects to water quality be, including effects to Medicine Lake water quality? Who will monitor changes in Medicine Lake water quality? | PH4.43 PH4.44

What will prevent contamination of water quality? | PH4.45

Why will workers only drink bottled water? | PH4.46

American Indian Issues

Does the consultation process have any bearing on the agency decision? | PH4.47

Vegetation

How many acres would be disturbed at the power plant and wellfield area? | PH4.48

Wildlife

What would be the effects of road construction on wildlife? | PH4.49

Land Use and Recreation

What is a roadless release area? | PH4.50

Transportation

Why will access to plant site pass through Bartel rather than through Tionesta? | PH4.51

Air Quality

Is the Siskiyou County Air Pollution Control District the only agency responsible for air quality monitoring? What if SCAPCD does not enforce standards | PH4.52 PH4.53

Will Calpine pay for air quality monitoring? | PH4.54

Will the project require a special use permit from the SCAPCD or any other approval that could be revoked if Calpine is not in compliance? | PH4.55

Human Health and Safety

What will the effects of chemical use, emission, storage, and disposal be on humans and wildlife? | PH4.56

Why are there hazardous materials signs posted at existing pads in the area? | PH4.57

Will the plant produce sulfur? How will the sulfur be handled? | PH4.58

Socioeconomics

What are the public benefits of the project to the local counties and residents? Will local residents be hired? | PH4.59 PH4.60

How much money would be borrowed from the government to construct the plant? | PH4.61

* * *

COPY

FOURMILE HILL GEOTHERMAL PROJECT

PUBLIC HEARING ON THE DRAFT EIS/EIR

* * *

REPORTER'S TRANSCRIPT OF PROCEEDINGS

* * *

SATURDAY, AUGUST 30, 1997

* * *

10:00 A.M.

* * *

MEDICINE LAKE HOMEOWNERS' MEETING

MEDICINE LAKE, CALIFORNIA

MICHELE D. DANCER, CSR 9199
CERTIFIED SHORTHAND REPORTER
PO BOX 286
MACDOEL, CA 96058

(916) 398 4294

MEDICINE LAKE, CALIFORNIA; AUGUST 30, 1997

* * *

MR. SHARP: I'd like to open it up to questions. If you have any formal questions that you'd like to submit to the agencies on the project, please state your name and give us any document you would like to have submitted.

Right there.

LOUISE THOMPSON: I will go. My name is Louise Thompson, I'm from Mt. Shasta. //I attended your whatever you call it, information session in Yreka on August 7th, and asked numerous questions. In fact, the whole audience asked them, and we were met with the response continually: "Read the EIS, we don't have the information right here at our fingertips." So I spent the last three weeks reading the EIS and I have comments and questions.// PH5.1

//"We should consider the entire Medicine Lake area, not just the well pads and transmission lines. It is a unit as a whole, surface and subsurface, air, water and atmosphere.// PH5.2

//"The public has been alerted to the status of endangered species all over the world; shouldn't the developers of our natural resources have to be concerned with protecting threatened species? PH5.3

"Case in point: In the EIS project book, in section 3.8, are listed twenty-two birds, including eight bats and six mammals who frequent this area. I have

personally seen most of the creatures on this list.

"Forest stands with late successional characteristics such as high canopy closure and large tree diameters provide favorable habitat for these species. Special habitat features such as lava flows, cliffs, caves, rock outcrops, large defective trees and large snags are important for many, many wildlife species.

"All of these features abound in the area proposed for power plant construction and in the transmission line corridor.

"We all object to the spoiling of the South American rain forests and the Southeast Asian lands. Should we then do the same thing in our area to satisfy the interests of the big money crowd?

"Twenty-two birds and six mammals existing in this area are listed on the federal and state endangered and threatened species, and also on the California Species of Special Concern, whose future is in doubt due to habitat destruction.

"Since birds and deer can't talk, we'll have to speak for them.// Eagles, goshawks and ospreys are known to have nests adjacent to Medicine Lake, which is suitable foraging habitat for them. How long will they stay here when the air becomes polluted with hydrogen sulfide and sulfur dioxide? PH5.4

"We're told not to worry because we can't smell it,

and it's still there, and it affects the environment."//

All the facts I'm stating are taken right straight out of that document, and some of them are straight quotes.

"How's the land use affected by this development? In section 3.11, the recreational use of Medicine Lake is detailed:

"Seventy-five improved camp site -- campground sites, plus a large day-use picnic area and boat launch ramp. An estimated 40,000 recreationalists visit this area each year; use has increased by eight to ten percent per year over the past three years. During the week, campgrounds have sixty-five percent occupancy; on the weekends, a hundred percent. Visitors predominate from Chico north, and even into southern Oregon. PH5.5

"The government, both state and federal, have used public money, our money, to construct and maintain this recreational camping and boating site.

"This will be diminished by tampering with the environment by well and transmission line construction. No longer will it be a pristine area; the closest to wilderness that many city dwellers experience.//

//"Snowmobiling as a sport has shown an increase in the last few years. Usually 200 to 250 visitors frequent Medicine Lake on holiday weekends in winter; an increase of twenty to twenty-five percent in the last three years. PH5.6

"Visual pollution by the actual power plant and

transmission towers will impact on the wilderness feeling of this area in the winter.//

//"Many visitors to the Lava Beds National Monument drive up to Medicine Lake as part of their visit. Use of the monument's wilderness area is about 8,000 visits per month during the summer season, with a three to five percent yearly increase in general visitation over the past three years.// PH5.7

//"A new industry has been developed in the Medicine Lake Highlands; mushroom harvesting from September to December. In 1994 no permits were issued; increasing dramatically to 865 permits in 1996 issued by the Goosenest Ranger Station. The Matsutake Pine Mushroom has great commercial value, especially in Japan. Suitable habitat and sources for the Matsutake mushroom abound in the area of the power plant, the well fields and transmission lines. PH5.8

"If the ground is disturbed, the continuation of the mushroom harvest will be affected and possibly ruined forever; a million dollar business will have been lost.//

//"Another reason I object to this development is that there's so many unknowns. How much air pollution will occur over the lake?// PH5.9

//"What disturbance will there be in this area of underground lava tubes and hot areas such as the HOT spot?// PH5.10

//"Will the lake level and the aquifer fall due to massive water well use during drilling and maintenance?// PH5.11

//"How well will the cabin area be policed during PH5.12

winter and spring months when cabin owners are absent but the additional roads and snowplowing will allow widespread travel by outsiders; could result in vandalism.//

//"Several places in the EIS, notes that there's insufficient data to evaluate the effects on the environment. Further drilling and reservoir testing must first be completed.

"In section 4.4, the capacity of the KgRA was made with very limited data, and it's probably an overestimate of the resource potential that can be economically developed. PH5.13

"The amount of electricity produced by the proposed project is subject to confirmation drilling and may be less than 49.9 megawatts.//

//"What about accidents and spills of hazardous materials and geothermal fluids?// PH5.14

//"Relating to Indian --" I'm just taking four or five out of the fifteen or twenty that are listed in that book.

"Relating to Indian artifacts, section point -- 4.6, if any are found, a 100 feet distance will be kept free of drilling and construction. Will this be enough to affect -- to protect the Indian sites?// PH5.15

//"American Indian consultants say the project will have a significant adverse effect on the spirituality of the Medicine Lake Indian Highlands. Twenty-six Indian cultural sites have been identified, kept confidential to keep PH5.16

tourists away. Local tribes do not consider effects according to specific sites, but rather on the whole Medicine Lake Highlands region.

"Medicine Lake and Timber Mountain are part of a whole integrated landscape which will be significantly affected by the development.//

//"Table 4.61, of the twenty-six sites listed by tribal members, eleven sites list visibility of steam plumes from the power plant; three list visibility of power plant lights. If visible from the tribal sites, it stands to reason that they will be visible from the campgrounds and the cabin sites.

PH5.17

"The project will introduce industrial elements into the forest landscape, thus disturbing the pristine quality of the environment.

"The defined mitigation may not fully mitigate the effect; the impact would therefore be considered a significant unavoidable impact.//

//"Visual quality, section 4.9. Lighting will be along the full length of the drill rig masts, 140 to 145 feet high, operated on a 24 hour basis.

"Steam plumes will be more visible on cold days, as they were related to ambient temperature. Dry days have high evaporation rates; cold day plumes are more dense and thus more visible.

PH5.18

"During the first two years of construction, well

venting will occur for two to six weeks; plumes range between 40 to 285 feet. Cooling tower plumes will occur during plant operation, extending from 110 feet in height to 375 feet in length, visible year-round; in winter, 250 feet high, 930 feet long.//

"The visual quality impacts that cannot be mitigated involve changes of landscape made by transmission line as seen from the lake, campgrounds and private residences.

"Heavy equipment and construction vehicles, as well as helicopters, will operate for the three weeks of construction -- three years of construction.

PH5.19

"After decommissioning it will take fifty to seventy-five years to restore forest conditions.

//"The permanent new source of night lighting will create a strong visual contrast with nighttime conditions in the area and have a significant visual impact.//

PH5.20

"In section 4.11 it is stated that visitors planning to stay in the Medicine Lake area who are bothered by the plant noises can move out of the area or make a decision not to hike or hunt in the proximity of such activities.

PH5.21

"What about the forty or fifty cabin owners; they can't move on to a new site.//

//"In conclusion, Option 7, no action alternative, is what I favor. Do not allow big money developments to ruin

PH5.22

this beautiful area. Thank you."

All these facts are in that book, every one of them.

MR. SHARP: Thank you. Mr. Moss?

CHARLIE MOSS: Yesterday at your meeting you identified Alternative 5 as the preferred alternative, which is A3, B1, C1.

MR. SHARP: C2.

CHARLIE MOSS: C2?

MR. SHARP: Alternative 6.

CHARLIE MOSS: // What effect does that have when it says it is the preferred alternative -- just because this says it's the preferred alternative, that doesn't keep, when it gets ready to go, the contractor from building A1, A2, does it? // PH5.23

MR. SHARP: It doesn't bind the decision-maker to select that alternative, they just have to give their rationale why they did not select the environmentally preferred alternative.

CHARLIE MOSS: // They take into account economics. The only reason that I can see that they would go that route would be to pick up the other power plants right along their line and save them building additional lines. // PH5.24

MR. SHARP: Well, it is a federal and state agency that makes the decision, not the company.

CHARLIE MOSS: Okay.

MR. SHARP: The company is bound by the decision. They may not like the decision that the agency gives when they select an action alternative and say, "It's uneconomical and so I'm not going to build the project," but the responsible -- federal and state count in this project, make the decision.

CHARLIE MOSS: One more question. This H2S, hydrogen sulfide, when it is combined with water, rain or snow or something of the like, isn't that apt to pick up HS, H2S. PH5.25

MS. McCLENAHAN: Not -- H2SO4.

CHARLIE MOSS: That's --

MS. McCLENAHAN: That's sulfuric acid, and what causes acid rain. You have a conversion of H2S to -- it's a reduction process so there are a couple different steps. We responded to this in writing, and the response documents explain it.

But basically the amount of H2S that comes out of the -- that's coming out of the power plant is pretty low. And what happens is that the H2S is emitted, H2S is emitted, and then what happens is it converts after a certain amount of time to another sulfur compound, and then anything left could convert. But basically the feeling of the air quality specialist was the amount of hydrogen sulfide that we're sitting with is so low, it will end up with such a minute amount, that acid rain is not an issue.

One of the things that we analyzed in the environmental document is the effects of the emission on the plants in the surrounding area as well as Medicine Lake. And with the dispersion, and basically the small amount of sulfur that's coming out, the effects are nondetectable probably, and there will be some probably monitoring of the vegetation in the immediate vicinity of the power plant.

But acid rain is not expected to be an issue because of the small level of sulfur.

CHARLIE MOSS: Thank you.

MR. SHARP: Anyone else?

Your name?

BARRY OHLUND: Barry Ohlund.

MR. SHARP: You have a comment.

BARRY OHLUND: //In dealing with what you were just talking about, that amount of acid rain is not an issue according to how many geothermal wells?// PH5.26

MS. McCLENAHAN: It's based on the full emissions and the finished cumulative impacts -- the air quality analysis is based on truly the worst possible case, where, for example, we analyze normal operation where you'll have the power plant operating; then we also analyzed the effects of the power plant operating with two wells venting.

Then we also -- the absolute worst case would be where you have two wells being tested at one time, and you have a power plant upset, where the turbine trips or

something, and you vent temporarily to the atmosphere. So we look at the maximum emissions, and again, the amount of sulfur that comes out.

The time that it takes for the hydrogen sulfide to convert to what could contribute to acid rain is a long time, and the dispersion with the wind and everything up here, the amounts are just very, very small.

BARRY OHLUND: Your answer is two wells?

MS. McCLENAHAN: Yes, yes.

BARRY OHLUND: //And how many wells are projected in the future? PH5.27

MS. McCLENAHAN: It's eleven, I believe.

MR. MERRIHEW: From nine to eleven now.

BARRY OHLUND: For this one plant the answer is --

MR. MERRIHEW: And worse case is with all the wells venting to the power plant and venting from the power plant, plus two wells in testing, proposed is the whole field at one time is the worse case.

DORIS MOSS: That's only from one site; we're looking at a lot more.

MS. McCLENAHAN: That's a cumulative impact, and we talk about it in general terms in section 4.17, what is the effect of this power plant and Telephone Flat, if they're both approved, what are the effects.

Now, they're doing an environmental impact statement for the Telephone Flat project, and in that

document that's one they define, what the emissions from that project will be. That subsequent environmental document on the Telephone Flat project will provide quantification of the cumulative effects of Fourmile Hill emissions and Telephone Flat.

But we're ahead of the process here, we didn't have the information on the specific emissions from the Telephone Flat project.

DORIS MOSS: Doris Moss, Mt. Shasta.// Your power line that has been designed, is it designed to carry enough megawatts for four or six plants?// PH5.28

MR. SHARP: Tim, do you want -- or Ray, do you want to respond to the design of the transmission?

MR. MERRIHEW: The capacity, I think, is what you're talking about?

DORIS MOSS: Yes.

MR. MERRIHEW: And designed for 300 megawatts.

DORIS MOSS: That's six plants, if you're doing 49.9.

MR. MERRIHEW: If we are doing fifty megawatts plants.

DORIS MOSS:// That's six plants that this is designed for, so I -- you know, I'm assuming that you wouldn't design a plant for more than you intended to use, so that infers you're looking -- the Forest Service or the powers-that-be are looking to do six plants in this area and PH5.29

use that transmission line; is that right, or is it wrong?//

MR. MERRIHEW: When you refer to six plants, I don't know about six plants; I know about one plant, this one.

DORIS MOSS: That's the fallacy of this whole thing.

MR. MERRIHEW: I need to explain hopefully to you why it's 300 megawatts, the capacity. The reason is, is the Forest Service has stated that there's going to be one utility corridor leaving this forest. So that -- let's just say the worse case is you do have six plants come in here. You're not going to have six power plants leaving it, you're going to have one.

So the first guy in, that's us, has to construct this power line to enable future reasonable development. And all we're going on is the USGS, I think it is, the USGS said 500 megawatts. And you don't want a 500 megawatt capacity line out here, so we opted for 300 megawatts. There was no contrivance that we know that there's six plants; we only know one plant that we are wanting to construct.

But we have to supply the power capacity for future reasonable development; on one line leaving this area. Which means we have to build it for 300 megawatts.

And if only fifty runs on it, then fifty runs on it. I don't know if that answered your question or not.

DORIS MOSS: Yes, it does.

BARRY OHLUND: Barry Ohlund.//I don't know how the process works, Forest Service accepting this or that, approving -- is this accepted for one plant or -- in the future it's as if they're stating the possibility is up to six plants; do they have to go through this process for each plant//or -- PH5.30

MR. SHARP: Each project has to go through an environmental process, and I assume it will all be an environmental impact statement. Each proposal has to be reviewed and disclosed and the impacts on it.

DORIS MOSS: Only singly, not collectively.

MR. SHARP: They will cumulatively look at the impacts of reasonable foreseeable actions. We have another power plant proposed right here at the Telephone Flat, adjacent to Alcohol Crater just to the east of Alcohol Crater a mile and a half east of -- west of here, excuse me, I'm dyslexic. Yes.

JIM SHOTT: Jim Shott, Mt. Shasta.//Has the lead agency made a decision on what alternative yet? PH5.31

MR. SHARP: No.

JIM SHOTT: Do they have to wait on the filing?

MR. SHARP: Till the final comes out. There was the analysis by -- in the document indicates what the environmental --

JIM SHOTT: And alternative six or -- seven is the best.//On the transmission line and also in the drilling, PH5.32

will there be any ionizing or nonionizing radiation involved with any of this?

MR. SHARP: I would defer to the company experts on that one, or Laurie.

MS. McCLENAHAN: I don't -- not that I know of? Tim?

MR. CONANT: I don't even know what you mean by your question, ionizing.

JIM SHOTT://Well, the transmission lines, as you know, puts out ionizing radiation, EMFs; basically boils down to the same thing,// And they found this in oil wells and drilling that they have come up with nonionizing radiation, which is basically radon. PH5.33

What's the possibility of that occurring, because you're going approximately the same depth as oil, right, or close, or maybe even deeper?// PH5.34

MS. McCLENAHAN: You're talking about radon emissions?

JIM SHOTT: That is one of them, yes.

MS. McCLENAHAN: Well, let's touch on the transmission lines first.

The concept of EPMF's has been the subject of a lot of study, and my understanding is there has just been a conclusive statement come out of -- was it the National Science Foundation.

AUDIENCE MEMBER: Speak louder.

MS. McCLENAHAN: My understanding is that there's just been a determination, I believe it was the National Science Foundation, that they don't consider EMF's to be quite the risk that was originally thought.

We do talk about EMF's in the Human Health and Safety section, 4.15, I believe it is, and EMF's drop off significantly, line is really dramatic with any distance from the transmission line; so does that address --

Now, as far as radon goes, radon is an isotope of geothermal steam. And the radon emissions are usually very, very low, and so the ambient concentrations are minuscule; it's something in the neighborhood of ten to the minus thirteen.

JIM SHOTT: But in the sense that you -- government talked about at one time the radon will collect there?

MS. McCLENAHAN: Radon is a gas, it will go up in the air.

JIM SHOTT: Okay. Thank you. //And on page 3.99 and 3.100, it keeps stating that timber harvesting has already adversely affected the habitat in this area. Well, this caldera has never been harvested, //so how could -- PH5.35

MS. McCLENAHAN: That's along the length of the transmission line. Remember, we looked not only at the segment within the caldera of the transmission line, but also the segment that goes to the north, where there has been timber harvest.

JIM SHOTT: At this time has there been a buyer for the power yet? PH5.36

MR. MERRIHEW: We don't have a firm contract, no, sir.

MS. McCLENAHAN: BPA has stated they are considering buying the power, but they have to go through the environmental process and consider environmental effects of that decision to buy power.

JIM SHOTT: That's all I have to ask.

//Incidentally, I'd like to ask the lead agency for a request to extend the comment period till October 30th, 1997, if that's -- in light of the facts of these meetings, because ultimately the last meeting was supposed to be August 7th,// correct? PH5.37

MR. SHARP: August 7th.

JIM SHOTT: Yes. That's why I would like to ask for a continuation of the comment period.

MR. SHARP: I think that request was also asked yesterday.

I will forward that. I really see no problem in doing it. I know Ed does not believe it, but I see no --

MARSHALL STAUNTON: Marshall Staunton, Tulelake.

//The question is geothermal and the quantity and amount of geothermal releases in the Glass Mountain area. These holdings -- looks like several have been explored, and it relates back to the total potential of the area. PH5.38

I was wondering if you could explain a little about the total potential for the area, if you explored with Cal Energy, it looks like there's seventy-five percent Calpine, twenty-five percent CICI and CECI; ownership on some is Calpine, fifty, CECI fifty percent on others.

And I realize that that may be changing, but I'd like you to elaborate. Because I guess my concern goes to the phalanx of the potential plant sites that maybe out there; if one plant goes -- and in the back of my mind I'm very concerned about more than one. //And so --

MR. MERRIHEW: I heard what you said, but I don't know where the question was, I'm sorry.

MARSHALL STAUNTON: //Has your company explored other potential sites other than the one that you're trying to develop? //

PH5.39

MR. MERRIHEW: No, we have not. Former companies have explored in the caldera, and the 17A6 well was one of the first ones that's at the base of Mt. Hoffman that was explored. And Cal Energy, who has acquired the leases from Unocal have three or four wells down in the caldera that were drilled, and those are the only ones that have drilled that have proven a commercial resource.

To an extent they're temperature gradient holds to just get a temperature, they don't produce anything. They don't get any fluid production, there's been just no -- none. There's twenty, forty or thirty of these over the last

fifteen years out here, but my company has drilled a temperature gradient holding 8828, its designation, at the plant site for our proposed Fourmile Hill.

We have not done any deep test well drilling; that needs to be done. Assuming this is all approved, we need to do confirmation drilling. But those are the only wells that have been drilled in the KgRA.

MARSHALL STAUNTON: //If you hold a lease, and supposing you do have to put money out to hold that lease, is that costly to hold out all the leases around this area? //

PH5.40

MR. MERRIHEW: Now I think we're getting into unit issues, and I'm a little rusty on the particulars of a unit, but basically when you form a geothermal unit, you drill a well, and that well -- that expenditure for that well holds that unit together for -- I think it's a five year period.

MR. SHARP: What the BLM requires is a rent by the lease holder. And then once -- if it is developed, there's a royalty that kicks in, but there's a yearly rent they pay.

Also, once the lease was issued there was a diligency requirement that the lease holders need to explore and identify if there is a resource there. And so they expend funds to do that exploration.

And then unitization, it's a one collective area. So if the money is expended on one lease, it is used as credit against exploration of another lease, because the leases aren't defined where the resource is; leases were

defined by geographic boundary.

That's a bureaucratic -- pretty much, I know, but a bureaucratic process.

Sir?

PHIL FACCHIN: Phil Facchin, Mt. Shasta.//I'd like somebody to explain here the Viscreen deal; what are the visibility// -- I need to determine that there's the -- we heard evidence -- PH5.41

MS. McCLENAHAN: We looked at what are the effects of the power plant emissions in terms of what you can see.

We used a computer model called Viscreen, which is a screening model. And you put in some numbers about emissions and wind speed, wind direction and temperature, and it looks at the dispersion of what comes out of the cooling tower. And it's a very, very simple model, it doesn't take into account terrain and mountainous areas.

And what went into that model is the power plant emissions, well testing emissions, as well as the emissions from the drill rig engines, their diesel generators that power the drill rigs. And those drill rigs run on diesel alcohol, they emit hydrocarbons and sulfur dioxide and nitrogen oxide and particulates, PMT10.

The model also included the dust from roads on up here from traffic driving on it for a worst-case scenario during construction, with the two drill rigs running. There was an exceedence (sic) of the threshold for where

visibility -- the model predicts that you may see a visible plume of oxygen particulates, so the modeling predicted that you may see that under certain circumstances.

In the document this is described as air quality, section 4.13. And basically we think there are -- the model is very conservative, or assuming of what went into the model are very conservative.

We called it a temporary significant -- potentially significant impact, because it exceeded the model's threshold.

PHIL FACCHIN: //In many cases it says that the test is unproven and basically doesn't really work, if you read it.// PH5.42

MS. McCLENAHAN: Exactly. The model has a few problems.

PHIL FACCHIN: //How can you tell that it works when you're saying in here many times that this test -- there's no guarantee what you've done is going to work?// PH5.43

MS. McCLENAHAN: The modeling doesn't -- what I state in there is that it over-estimates emissions and how -- what you will see. And based -- we also say based on our experience at other geothermal fields.

I worked on a project where there were four drill rigs operating in one pretty narrow, confined valley, and there was no visible plume. This was off a Navy base where high visibility was critical.

PHIL FACCHIN: // How come we can't find anybody that's been around these other plants that like it; that have anything good to say about them? PH5.44

MS. McCLENAHAN: That's a different issue from the visibility.

PHIL FACCHIN: Still, // you haven't proven to me I'm not going to sit here and see this thing in the winter or at any other time. PH5.45

MS. McCLENAHAN: Let's straighten this out. What Viscreen is talking about is simply seeing a plume of dirty air. And again, to clarify for the geothermal project, you have two kinds of emissions: The drill rig that emits the nitrogen oxide particulates, and the power plant that's emitting primarily water vapor, which you will see, you will see a cloud.

And as we state in the document, and as you stated as well, this plume is bigger when you have cold, moist air, there's more condensation, and you have more of a cloud, than on a very hot day, you may not see anything coming out of the cooling towers because of the evaporation.

So there are two different -- therefore the Viscreen relates to the potential for seeing dirty air, versus it's a different subject in the visual section; we talk about seeing that steam plume and how big it will be.

PHIL FACCHIN: Okay.

MR. SHARP: You are?

NIILO HYYTINEN: Niilo Hyytinen. I have a couple comments and a few questions. // And is it my understanding that all venting will be -- actually be reinjected into the ground again and there will not be any actual open venting except for probably the drilling of the wells? // PH5.46

MR. SHARP: Is that --

MS. McCLENAHAN: No, that's not exactly right. The way the process works is wells will be vented to the atmosphere. You have two components, you have steam and you have hot water. So in drilling and testing the wells you will have emissions in the air of the steam and the gas and the resource, and then the water will be contained in a sump.

Now, as far as the power plant works, the steam will go through the power plant and will go -- will be condensed, and that water will go through a cooling tower to work the condensers, and so you will see steam emitted.

But the hot water that's separated out from the steam, and the excess condensed water will be returned to the reservoir.

JIM SHOTT: Don't they call it a binary process if it all is reinjected in the ground and you use a separate element for pushing the turbines?

MS. McCLENAHAN: Right. The binary process is another way to create energy from a geothermal resource; however, binary, which is where you bring the fluid up and

it's contained and it heats another working fluid, and then geothermal fluid goes directly back down to the reservoir, that's very inefficient, and I don't think it can even be used because of the temperature of this resource.

Binary plants are used at a much lower temperature.

JIM SHOTT: I used to have two within two miles of our home in Reno there are two binary plants; one with a twenty-five megawatts and other is approximately ten.

MS. McCLENAHAN: Right.

MR. CONANT: You're talking about a isobutane fluid. It's a very flammable fluid, it's a much noisier process. There are a lot of negative aspects to a binary plant.

Binary plants are normally used when you have a normal lower resource temperature and you can't capture the energy without going to a different fluid.

JIM SHOTT: I see. I was just going to mention that the plants, that they are the binary ones, and I go by them quite often, and there's no noise within a hundred yards of them, you can't even hear them.

MR. CONANT: Go to the plant.

JIM SHOTT: One thing that I would think --//my wife and I and my family would strongly object to the A1 line coming close to the lake. And then basically we have no objection to the geothermal within the basin, as long as it's

PH5.47

within two miles or more of the lake.

And keep all the major activity away from the lake, because there is a tremendous resource there, and I certainly am not against utilizing it.

MR. SHARP: Back there?

LARRY LIVESAY: Larry Livesay, Dunham and Livesay in Macdoel.//I am a hundred percent for the geothermal well coming to Siskiyou County.

I want to bring us back to a point on sulfur emissions. We have an air pollution officer here, he can verify anybody's concerns of emissions of sulfur into the atmosphere or acid rain.

I've been working with sulfur for over twelve years from the geyser, Unocal, sulfur extracting from crude oil, with the refiners.

We make good excellent sulfur plant food. We've been putting it on alfalfa in Macdoel, Shasta Valley, Scott Valley, probably twelve years now. It's an excellent plant food.

We should be so lucky we have this hot water in our county to develop with the power.//

AUDIENCE MEMBER: Do you own a cabin up here?

LARRY LIVESAY: I'm up here most of the time, I have a cabin in Macdoel, I have a place where I --

AUDIENCE MEMBER: That has nothing to do with Medicine Lake, sir.

PH5.48

LARRY LIVESAY: That if you're concerned about is you want electricity, you want power --

AUDIENCE MEMBER: No, no, no, no, we don't.

MR. SHARP: The gentleman has a right to speak when attending a meeting.

LARRY LIVESAY: // You say you don't want it in your backyards, but it's in my backyard, too. I pay county taxes in this county, too; I come here -- that we do -- or your question, do I have a cabin out here? I respect this whole area environmentally as much as you, sir.

Once again, welcome to Siskiyou County, good luck. You might have the air pollution officer explain the environmental quality that you have to perform. I'm working with him now to produce sulfur. I know my bill for equipment, for scrubbers and inspections is over $600,000.

I'm a little person, I work hard, I know what you have to go through. Thank you. //

PH5.49

MR. SHARP: Thank you. Yes.

MARTHA SPENCER: I'm Martha Spencer. // I have a question for the Forest Service representative. The EIR talked about there being a significant impact or a significant concern with the compatibility with the forest plan, and I haven't seen the forest plan for this area.

I was just wondering if you could address that. Is it, you know, consistent with it or compatible with the forest plan for this area, and if so, were you going to

PH5.50

change the forest plan? How does that, you know, work?

MR. SHARP: You want that one, Brad, talk about the Native American --

For this particular area it's right with the National Forest Plan. In that plan it identifies the potential for geothermal resources in there, so geothermal development is consistent with the direction of the forest plan.

What isn't consistent is to have the Modoc National Forest plan a designation for a formal utility corridor, so that's the amendment to the forest plan, if the project is approved.

As I said, is there a formal utility corridor designated within the plan, now the Klamath -- Jim, want to -- on behalf of Klamath?

MR. STOUT: The environmental impact statement process identified a forest plan and traditional cultural properties or cultural resource section that showed that we were offering more protection than we could actually enforce because we were -- we were making statements that exceeded the minimum for our laws.

So we were making a change in our forest plan to be more consistent with the federal laws and protection of traditional cultural properties and be consistent with the Modoc plan, and that's the change that would have to be made.

And I think this significance is under CEQUA, and it's -- we considered it not a significant plan amendment.

MR. SHARP: Get the problems of the normal environmental policy with the California Environmental Quality Act. They're not as compatible as they should be.

Did that answer your question?

MARTHA SPENCER: Yes. Maybe.

PAUL CORDERO: Paul Cordero (phonetic). // I wanted to know why that in the literature you put out prior to the IRA (sic) report, there was nothing mentioned about infringing on the people's right to use the public lands in this area.

PH5.51

And I believe, Mr. Stout, I think you were the gentleman that made the statement in Yreka that there would be no shooting on the leased lands. Isn't that the way you put that?

MR. STOUT: It was basically that we said that for public safety or safety of the people working in the plant, there would be some sort of restrictions on shooting in and around the power plant site.

PAUL CORDERO: How large a area?

MR. STOUT: Five acres, ten acres maximum. Similar to the restrictions you have around Medicine Lake here.

PAUL CORDERO: That's two miles; are you going to put two miles around -- say they make six plants --

MR. SHARP: He was differentiating the type of

restriction versus the scope of the restriction. Scope of the restriction would be right around the power plant where the -- Fourmile Hill, but the type of restriction would be similar to what you have around the lake here.

If you could state your name, please.

BOB AWBREY: Bob Awbrey. // We talked about this yesterday a little bit. You said that each one of the sites would probably be fifty acres, covering the pads and everything. This two mile area -- and I'm looking at a map here of this proposal.

PH5.52

If the Forest Service puts in this firearm restriction as it does around Medicine Lake, and I thought it was -- I said two miles yesterday; somebody said one mile, and on the one mile we're looking at approximately eight square miles around each site.

MR. SHARP: Actually --

PAUL CORDERO: No discharge of firearms; we got two sites now, one here and one potential at Telephone Flat. If we go with four more, that's six.

BOB AWBREY: // My figuring there, if we go -- and this is one mile restrictions, we're looking at forty to fifty square miles of no shooting.

And now, you hunters in the area might give that a -- might not like that.

PH5.53

This is an area that is heavily hunted, it affords a terrific amount of recreational opportunity by hunters.

This is something that I think needs to really be considered.

MR. SHARP: Okay. Thank you.

BOB AWBREY: Think that elaborates on what Paul was saying.

PAUL CORDERO: Did you have any more to say?

MS. McCLENAHAN: Can we clarify that? Sorry. To backup, I might clarify the actual no-shooting area? Because it sounds like this is a real important point, and I think we've multiplied some numbers.

BOB AWBREY: We asked yesterday, somebody in Mt. Shasta asked what the area would encompass in each site, and I think it was your statement that approximately fifty acres --

MS. McCLENAHAN: Let me clarify that as it relates to the no-shooting area. The power plant site is ten acres; that's where the power plant will be and that will be fenced. And that's the specific area that the forest service is saying we'll have no shooting, right around that ten acre area.

The fifty acres is the amount of surface disturbance for the power plant and the well field.

BOB AWBREY: Okay. But even if you go with the ten acres, you're looking at -- if we -- they go with the restriction that they have now on this lake, two miles --

MS. McCLENAHAN: But not a two mile restriction.

MR. SHARP: Total mile restriction would be the ten

miles -- two miles around, I guess it would be; ten acres total.

BOB AWBREY: // More like it would be -- I'm asking the Forest Service, what is the restriction about discharging a firearm around this lake? Two miles around in all directions from the lake. If you have ten acres, you're going to go two miles north // -- PH5.54

MS. McCLENAHAN: No, that's not right. That's not what they're saying.

MR. SHARP: That will be responded to in the --

BOB AWBREY: // Well, it's something that somebody better -- I mean, better look at and look at it very closely. You might need to diagram what the actual restriction is. // PH5.55

MS. McCLENAHAN: Map the no shooting area.

BOB AWBREY: // Map out the no shooting area. // PH5.56

MR. SHARP: Your name?

SUE SPENCER: Sue Spencer. And I have both a comment and I have a question for the gentleman from Calpine and for Mr. Sharp.

And my comment first of all is, // I think we need to keep in mind we're looking at public lands and appropriate use of public lands. And the appropriate use for this set of public lands is recreation. That's what the last twenty years has been spent doing is developing it for recreation. A very important part of that recreation is the wilderness PH5.57

aspect. And everything I've heard has indicated this project will significantly impact that aspect. All the way across the board. And it can't be mitigated.//

The second -- that's my comment.

The question I have, number one, is//how much does the Forest Service get per year from each lease from Calpine?// PH5.58

MR. SHARP: Forest Service gets zero. It all goes to the Department of Treasury.

SUE SPENCER:// How much does Calpine pay for the use of leases?// PH5.59

MR. SHARP: Pay? They pay a rent.

SUE SPENCER: How much in rent?

MR. SHARP: That's per acre. It goes to the Treasury, it doesn't come to the respective agencies.

SUE SPENCER: You have records of that?

MR. SHARP: Yes.

SUE SPENCER: We'd request to get that.

MR. SHARP: They're all -- you'd indicated --

SUE SPENCER:// I'd like to know what private industry is paying for the use of public lands right now// -- PH5.60

MR. SHARP: If they do develop, there's a royalty that --

SUE SPENCER: -- per month that --

MR. SHARP: -- goes to the U.S. Treasury. And fifty percent of that royalty comes back to the state, and of

that, forty percent goes to the county of origin; another forty percent will go to the California Energy Commission, and another -- essentially they go to the -- determine the -- a slush fund for the State of California.

SUE SPENCER: And the second question --

MR. SHARP: This is a tax benefit.

SUE SPENCER:// I want to know how much in ten years your profit is going to be on this project.// PH5.61

MR. SHARP: You're talking about Calpine?

SUE SPENCER:// I'm talking about Calpine; how much money are we talking about you guys making?// PH5.62

MR. MERRIHEW: We don't have a contract yet to be able to determine -- to be able to give you an honest answer. In order to figure out what the royalties were, we used a basis of -- I don't know, it was three to eight cents a kilowatt hour or something like that. And I figured it out, and off the top of my -- I don't remember what the royalty calculations were. But I have no idea what the internal rate of return would be.

SUE SPENCER: The reason I am asking that is because//it's my understanding that geothermal development is a real sketchy business. Sometimes it gives and sometimes it doesn't. I think a real big problem with this project is we could get all the bad things and there wouldn't be any economic viability at all.// PH5.63

//And I say that also because right now we all know PH5.64

that the power industry -- there's no need for this project, it's just not there. We have plenty of power. So unless we can document a real need, why are we going on public lands right now?//

ANN SPENCER: Ann Spencer. I'm an environmentalist.//I think I look to the Forest Service to recognize the absolute beauty of this area; the desecration of so many other areas in California and Oregon. I think we need to look at the future generations. I think we're being penny-wise and pound foolish. We're looking at a value that is absolutely unbelievable, and I'm not sure that many people who have not been acquainted with this area are even aware of it.

I think we're looking to balance it with a monetary -- a business that has really no meaning, if you think in terms of future generations, and what we have. I think to do anything that might impact on this area, which is so invaluable in its state right now, is not moral.

And I think the Forest Service needs to think in terms that they protect the public. This belongs to the public. And it must benefit the public, and it must belong for generations.//

MR. SHARP: And you are?

MICHELLE BERDITSCHEVSKY: Michelle Berditschevsky. I have a few questions.//Has there been an economic feasibility study for this project?//

PH5.65

PH5.66

MR. SHARP: The environmental document looks at the economics, and also I assume that Calpine has done an economic analysis of it, too.

Ed, you want to respond to that?

MR. MERRIHEW: I think the best way to respond, and I hope you appreciate the fact that I'm only in the environmental side to get the permits necessary for building power plants; I'm not in the business development side, so I can't talk intelligently about the economics.

I don't know how much of that's been done.

I do know this, that it's market driven, and if we can get a firm contract that makes us money, we'll move forward; if we don't, we won't. It's that simple.

MR. SHARP: If you get approval.

MR. MERRIHEW: That's a given. That's a given; if we get the approval, we will move forward.

MICHELLE BERDITSCHEVSKY: I have two more questions.// Has the need for the project been documented in light of the deregulations of the electricity in this industry,//the power -- I mean, has that been --

PH5.67

MR. SHARP: I'm not an expert on the deregulations.

Ed, you've been dealing more with the regulations.

MR. MERRIHEW: I think to a large extent it's somewhat the same question. This is purely market driven. And what we're seeing today is what we call hot plants. And that would mean that you build believing that you have a

power sale at a power marketplace without a firm, long-term contract.

That's what deregulation has done in the industry. But again, I'm falling back on the fact that it's still market driven. If there's no market, you're not going to construct and build something if you can't sell it.

MS. McCLENAHAN: I'd like to add to that, in chapter 1 there's a discussion of the purpose and need for the project. The primary purpose and need stems from both state and federal policies to encourage the development of renewable resources to offset imported fossil fuel.

And in addition, as Randy was mentioning about deregulations, there apparently is a market for people to buy what's called "green power" from renewable energy sources that have less emissions than fossil fuels, less emission of greenhouse gases, and generally less environmental effects.

And geothermal is classified as a green power. And we'll see what the market is for it. There have been a number of studies; various utilities have polled their customers to see if people would pay a premium for green power, and apparently there is a market.

JANIE PAINTER: Excuse me, I'd like to --

MR. SHARP: Your name?

JANIE PAINTER: Janie Painter. //I doubt if these customers want to see a beautiful, pristine place like Medicine Lake destroyed environmentally, visually and PH5.68

culturally so these people can have green energy.

Let them come to Medicine Lake and see how it is now. I don't think they'd want this construction here and all this devastation, personally. That's my opinion.//

MR. SHARP: I guess I would respond to -- that's what the process is about, to disclose what the environmental effects are to those who want to purchase this power, and make it from an informed decision.

JANET SERVER: Janet Server, I teach second grade at Alturas Elementary School. And//I'm absolutely amazed that it's gotten this far; that somebody doesn't say no, that this beautiful place -- this isn't going to happen.

I'm not against progress. Yes, we need power, that's fine. But why here?

All of us here, not one of us will be here a hundred years from now. I think we need to think about that. I think we need to think about the kids that will grow up. My eight year olds in second grade will not be here a hundred years from now, but their kids will be. PH5.69

I think people want to know about that. I don't think there's a lot of people that have seen this or maybe -- I don't know, I don't want Calpine people to starve, no, but I'm sure they've got their finger in -- fingers in other places.//

MR. MERRIHEW: Thank you.

DORIS MOSS: Doris Moss. //You're talking about the PH5.70

people are willing to pay for the greenhouse type power, green energy, okay. What is the cost difference between hydroelectricity and geothermal? What would be the cost difference to the consumer; do they know that, how much they would have to pay; is it less or is it more?

MS. McCLENAHAN: It's more.

MR. MERRIHEW: It's more.

MS. McCLENAHAN: It's more.

DORIS MOSS: How much?

MS. McCLENAHAN: A few cents a kilowatt.

DORIS MOSS: How many cents a kilowatt?

MR. SHARP: Ed, do you have a range of numbers?

MR. MERRIHEW: This is a real broad range. Natural gas probably goes for two to three cents to you, three cents, and geothermal would be, well --

MR. CONANT: About six.

DORIS MOSS: What about hydroelectricity?

MR. CONANT: That's at the plant. At your house it would be a difference between like twelve and fifteen.

MR. SHARP: What's hydroelectric was the question.

MR. MERRIHEW: I don't know what hydroelectric is.

MR. CONANT: It depends on the site, depends on what -- how much -- the dam was built fifty years ago; you're talking about a brand new dam. That's, you know --

DORIS MOSS: //We're talking about the cost difference to the consumer percentage-wise; is there an PH5.71

increase?//

MR. CONANT: It would not be two percent, it would be like fifteen to twelve.

AUDIENCE MEMBER: Between fifteen and twelve?

MR. CONANT: And at your -- how long --

MS. McCLENAHAN: Some estimates are less as well. Maybe a ten percent increase, because --

DORIS MOSS: I'm sorry?

MS. McCLENAHAN: Some of the estimates have been paying ten percent more for green power because there are some programs for supporting alternate energy production.

DORIS MOSS: You mean subsidizing it.

MS. McCLENAHAN: Potential subsidies, right.

DORIS MOSS: //That's the tax payer that's subsidizing the government, which is us.// PH5.72

MS. McCLENAHAN: Those are already in place.

MR. SHARP: Sir, your name.

JOHN STAUNTON: John Staunton, Tulelake, Klamath Falls area and a cabin owner.// I would like a question answered in my mind, is this entire program subsidized by the federal government?// PH5.73

MR. MERRIHEW: No, sir.

AUDIENCE MEMBER: Oh, come on.

MR. SHARP: Ma'am, please.

JOHN STAUNTON: //Define the program for the plan for the development for well safety.// PH5.74

MR. MERRIHEW: I'm giving you a number here, I don't recall what was even said here, a hundred twenty, hundred fifty million dollar project, and that's private financing with Calpine, that's -- the federal government is not subsidizing that at all.

It will be private industry that develops, and Calpine will do it with a stock release or some sort of financing, some sort of private financing that's beyond my understanding even how they do it.

JOHN STAUNTON: //Then we're talking about green power, and we realize that that is subsidized. So if I'm a irrigator in the Tulelake area and have fifty electric pumps, I can get a subsidy to use green power? // PH5.75

MS. McCLENAHAN: I think that's beyond our scope of --

MR. SHARP: That's outside --

MR. MERRIHEW: I don't have any idea, sir, on what happens there.

AUDIENCE MEMBER: There's an energy tax credit.

MS. McCLENAHAN: You can get a grant from the California Energy Commission possibly to get a geothermal heat pump where water, for example, is preheated to heat your house. There are programs like that to encourage conservation.

JOHN STAUNTON: //This is what I am getting at, is it primarily the individual household, or is it primarily the PH5.76

industrial that -- this green power advantage subsidy? //

MS. McCLENAHAN: Well, the idea -- well, the subsidy is designed to benefit everybody by the reduced air emissions and reduced environmental effects. I mean, I don't know enough about the subsidies or what they are or -- so that's sort of -- I don't really have details on that.

But one of the sources is the federal royalties on geothermal that come back to the state; the California Energy Commission uses some of those funds to participate in research for different projects and things like that.

But there are no subsidies to this particular project, right now, that we know of.

JOHN STAUNTON: Thank you.

MR. SHARP: Yes.

DORIS MOSS: Doris Moss. //What kind of tax benefit is there to the developer of this? What kind of tax credits does he get for his invested dollar to use green power? // PH5.77

MR. MERRIHEW: I'm not familiar with any, I don't know, I'm not an accountant. But I don't know of any tax credits for this particular project.

PAT CURREY: When it is clear --

MR. SHARP: Your name.

PAT CURREY: Pat Currey, cabin owner. // Down in the Bay Area, San Francisco Bay Area, they built thousands and thousands of windmills. And those were all subsidized, people got tax credits to construct those. And they built PH5.78

thousands of these things.

And they did not use them because they could not sell them because it was so much more expensive, their existence, that they could not sell the power.

And they're just sitting idle twenty years later, and yet the developer -- I don't know who developed them, but the developer got tax credits to where they were constructing these things almost free because of the benefits.

And that just increases the cost to the county, the people. We have to pay for it because of the tax credits. And I think that's kind of -- the basis of the question is, how much are you, Calpine, being subsidized? How much is going to come -- out of the hundred fifty million dollars is going to come out of your pocket and not out of ours as property owners? Have they changed the laws to where you're not getting these tax credits to build these boondoggles like they did in the Bay Area?

MR. MERRIHEW: There is no tax credits for this project that I know of, at all.

PAT CURREY: The hundred fifty million is coming out of your jeans, not mine.

MR. MERRIHEW: Privately financed by Calpine, yes, sir.

CHARLIE MOSS: Charlie Moss. In discussing this with the manager of Pacific Power and Light, the way that he explained it to me, this private money that you're talking

about, Mr. Ericson here donates a hundred thousand dollars to you for the development, and then he gets --

MR. SHARP: Let's get in line with the amount.

CHARLIE MOSS: He gets a two hundred thousand dollar writeoff to the government. That's the way that it was explained to me; that's where you get the private money, is individuals donated it or corporations, and then get to write off double what they have donated to this project. Now that's the way that he explained it to me.

PH5.79

So in the long run, the taxpayer is picking up -- you got the money for free to do it, the taxpayer picks up the two hundred thousand off his income tax. That's the way it was explained to me. That was what was explained to me. I don't know whether it's right or not.

MR. SHARP: There's accountants that make a profession out of --

RANDY MILLER: Randy Miller. I read an article in the Alturas paper on March 31st, and I'm kind of curious to see if it's accurate. And I hope it's not a bunch of baloney. I'd like to read it and see if it is.

I wanted to mention also that our company, we are one of the major tax payers, and probably the largest employer in Modoc County, except for the Forest Service, but -- so I'm conscious of taxes very much.

PH5.80

One of the things that -- we're always looking for help too. I just want to know if this is true, it's written

in the paper, it says, "The decision whether to allow construction of the plant could come later this year.

"Calpine states the plant will employ nineteen people. The company would pay an estimated 1.3 million in property taxes and another twenty to twenty-five million in royalties to the federal government. One half of those funds would be returned to the State of California, and forty percent would be distributed to the county where the power plant and transmission lines are located."

So I just run some basic calculations. I thought that this area, if this is true, could benefit by probably five to seven, eight million a year from this in taxes; is that true or not?

MR. SHARP: I don't know about the royalty figure, I don't know if that was over per year. I don't think it's fifteen million dollars per year in royalties.

MS. McCLENAHAN: For the first twenty years.

MR. MERRIHEW: Yeah, okay.

MR. ADAMS: Over the course of the whole first twenty years.

MS. McCLENAHAN: Over the first twenty years the royalty payments would be fifteen to twenty-five million. Of that the state would get 4.5 to 7.5 million, and Siskiyou County would get three to five million.

RANDY MILLER: That's over twenty years?

MS. McCLENAHAN: Over twenty years.

RANDY MILLER: That's over twenty years, that's not so good.

MR. SHARP: That was just in federal royalties.

MS. McCLENAHAN: There's the state and county property tax payments would be approximately twenty million over the first twenty years, in addition to the federal royalties.

MR. SHARP: Yes. Back.

AUDIENCE MEMBER: // I got one question to ask you; you're going to sell just forty-nine megawatts of the power to Bonneville Power. When Bonneville Power runs that over their lines, how are they going to determine when they sell this out to the general company, that that's green power or not? They're not going to make -- for a little ol' diddley thing like that you're not going to make an adjustment of power rates. // PH5.81

ANOTHER AUDIENCE MEMBER: Your light bulbs come on green.

AUDIENCE MEMBER: // This BP&L, it's not going to change their power rate. Going to do the average consumer absolutely no good; that's just a smoke screen you're putting up. // PH5.82

MR. SHARP: I wasn't ignoring you, I had other business to attend to. We don't have a representative from BPA, and it's a particular --

AUDIENCE MEMBER: You know yourself they're not

1 going to change it for buying that little bunch of power. No
2 way are they going to change the rates.
3 AMANDA SPENCER: Amanda Spencer. // I haven't had a
4 chance to read the EIS, but my question is, what types of
5 wastes will be generated, and how are you going to handle
6 those wastes? //
7 MR. SHARP: Laurie, you've been answering that
8 question before.
9 MS. McCLENAHAN: The biggest waste from the power
10 plant is the spent brine, the geothermal fluids. And in some
11 respects the plant is self-contained in that the fluids do
12 come up that go through the plant, the cooling tower, and the
13 excess fluids that aren't used are returned to the reservoir.
14 So the volume produced is sixty to eighty percent
15 returned to the reservoir, depending on evaporation rate.
16 AMANDA SPENCER: // What's the total volume that you
17 produce? //
18 MR. CONANT: Total volume in tons, pounds per hour?
19 Pounds per hour of water produced is about three million.
20 And reinjected is about 2.3.
21 AMANDA SPENCER: The other million, what do you do
22 with that?
23 MS. McCLENAHAN: It's evaporated.
24 MR. CONANT: Seven hundred thousand or so that's
25 vented into the atmosphere as a form of vapor.
26 CHARLIE MOSS: Seven hundred thousand gallons?

PH5.83

PH5.84

1 MR. CONANT: Seven hundred thousand pounds per
2 hour.
3 MS. McCLENAHAN: About a hundred thousand gallons
4 per hour.
5 CHARLIE MOSS: A hundred thousand gallons per hour
6 going into --
7 MR. CONANT: Divided by five hundred.
8 CHARLIE MOSS: Five hundred thousand gallons per
9 hour going into the atmosphere?
10 MR. SHARP: That's not right.
11 MR. CONANT: I think you're getting your numbers
12 wrong. There's three million pounds per hour of fluid
13 withdrawn, and 2.3 million are going to be reinjected as one
14 form or another. The balance of it -- you got about a
15 hundred thousand pounds per hour that comes out of the --
16 that's going to come out as water vapor in sort of a muffler,
17 and the rest is going to come out of the cooling tower.
18 You take seven -- take pounds per hour, and you
19 divide that by five hundred, and that gives you gallons per
20 minute.
21 JANIE PAINTER: I'd like to add to that.
22 MR. SHARP: Your name?
23 JANIE PAINTER: Jane Painter. // You have all this
24 evaporation and all that coming out of the ground. Where is
25 that going to be made up? Is it water that's going into the
26 atmosphere; are you going to be pumping water back down into

PH5.85

the well to make up for that evaporation?//

MR. CONANT: No, that's -- that's is a water-rich water-dominant reservoir, and the water.

JANIE PAINTER: //You mean, you're taking that much water out of the reservoir, not remaking it up out of the surface water or something like that? Nothing? There's evaporation you're going to be taking from the top side.// PH5.86

MR. CONANT: You're not taking from surface water, making it, no.

CHARLIE MOSS: You're taking ground water.

MR. CONANT: We're talking reservoir water, not ground water, it's reservoir water.

CHARLIE MOSS: How did you get water to the reservoir if it doesn't come out of the ground?

MR. CONANT: From the reservoir. If there was not a barrier between the geothermal reservoir and the surface water, there wouldn't be a geothermal resource here. That's why you get a geothermal resource, because there's a barrier there. Without that barrier, you don't have a geothermal resource that's tapable.

To explain it further than that, we'd have to have a geologist here. They could go through all kinds of stuff. But it probably would bore me, so it would probably really bore you. That's why it --

AUDIENCE MEMBER: That's the geyser. //If they run out of water in the reservoir?// PH5.87

MR. CONANT: We're reinjecting that reservoir. That geyser you speak of, that is a steam dominated reservoir, and this is a water dominated reservoir. That's a tremendous quantity of water in this reservoir.

MS. McCLENAHAN: The difference is at the geysers, water was -- there wasn't very much injected and they're just starting to inject water again; versus in these two-phase flow systems, most -- the majority of the fluids removed are returned to the reservoir.

MS. SPENCER: //You're not having any sumps then for the remaining water; you're only having two systems, one that's reinjected, and the other that evaporates?// PH5.88

MS. McCLENAHAN: Sumps are for drilling. When they drill the well, you produce steam and hot water, and the sumps hold drill cuttings and water. So there will be some sumps at the well pads.

MS. SPENCER: How much is that generally?

MS. McCLENAHAN: They hold about 750,000 to a million gallons.

MS. SPENCER: That percolates back into the ground water?

MS. McCLENAHAN: The pumps are lined. There is a defined limit of permeability of ten to the minus six milliliters per second to contain any fluids. The fluids in the sump can be returned to the reservoir through injection wells.

MS. SPENCER: // I guess my concern is I work for a environmental consulting firm. And we're generally hired, after you guys come in, to clean up the mess. And that's what I'm concerned is going to happen here. // PH5.89

JANIE PAINTER: Jane Painter. // Did the EIR/EIS say there was going to be a certain amount allowed for leakage of the sump in there? // Right in the -- PH5.90

MS. McCLENAHAN: It says the sumps will be lined to a permeability of ten to the minus six milliliters per second. It also said X milliliters for leakage into the ground.

MR. CONANT: The permeability rate is described as a ligan rate. That is how much water is going to penetrate per unit pound, ten to the minus six centimeters per second is what the unit is. That's -- the utility pays that out by an hour you put water on that thing, it's going to penetrate through that soil that far.

They calculate that out ten to the minus six. That's one millionth of a centimeter every second. Multiply that out by a second, it doesn't go anywhere. It's virtually -- it's like -- like concrete. Water is not going to go through there, but it's going to sit on top.

JANIE PAINTER: Concrete is porous.

MR. CONANT: Do the calculations, it's real simple math. Multiply it by sixty, that's how many centimeters were going to go in a minute; multiply that by sixty, that's how

many are going to go in an hour. Multiply that by -- multiply it out.

JANIE PAINTER: Do that for forty-five years?

MR. CONANT: You're not going to have any water in the sump for forty-five years.

JANIE PAINTER: Where will it go?

MR. CONANT: The drilling sumps are used during the testing, and the water is put in there, and the water is piped over and reinjected.

MS. McCLENAHAN: Sixty to ninety days is the period for -- thirty to ninety days for drilling.

CHARLIE MOSS: You're talking about drilling water, and we were talking about the use of the plant itself. This is simpler than the emissions.

MS. McCLENAHAN: The sumps are for the drill pads, so the sumps are at the drill pads. These sumps are used temporarily. When they're done using them, they inject the water that was in there, and it also evaporates.

MR. SHARP: Yes, sir. Identify your name.

ERIC NELSON: Eric Nelson. And I have a couple questions and comments. // So geothermal, for the process, it's considered a renewable energy, even though this project is only supposed to last fifty years, right? // PH5.91

MS. McCLENAHAN: Forty-five years is based on the contract term, the supposed contract term, the -- it's hard really to know. Literally they have been producing power for

ninety years.

ERIC NELSON: Okay.//As far as the graph in the EIR, at the beginning of it, it goes through all the significant levels and everything, for all the options; how do you guys determine significant versus less than significant?// PH5.92

MR. SHARP: There's established criteria that were identified in chapter four for each resource; identifies criteria so we have to try to remove some of the arbitrary depreciativness of it; we're left with a standard that we have based it on.

ERIC NELSON: I apologize, I haven't had a --//I strongly support Jim and other people's recommendation that the comment period be extended to the end of October. I haven't had a chance to look at it.// PH5.93

//I'd like to go on the record as supporting Alternative 7 at this point, given I haven't had a chance to go all the way through it.// PH5.94

// Basically my biggest objection is that, you know, putting the transmission line in is going to allow for the building of additional power plants and, you know, at least six, as these guys said, and -- if not more. And to me, you know, the need for -- at this point that process is not supposed to be piecemeal, it's supposed to consider all cumulative impacts. PH5.95

When you talk about that, it's analogous to

allowing a developer to put a road into a place, and, "We're going -- only going to build on the two lots at the end of the cul-de-sac," when, you know, in reality I think the whole thing is going to be built out.

You have to consider the impacts of six of these things at least, if not, you know, if not more, if in reality that's a goal down the road. Unless the Forest Service or BLM or whoever is going to say they are going to look at these plans and say they're not going to allow development within these sections. Because the map shows that there's potential for lease development in the whole KgRA area. And this transmission line is going to allow for development. So it's not following the NEPA process to just say we're only talking about one power plant.//

MR. SHARP: You have a question, in the hat?

DEBRA MATHEWS: Debra Mathews, cabin owner.

In regards to -- and//I'm going to make a comment to surmise the economic standpoint of this, is number one, we don't have an inbuyer.

Number two, data supports that there is a deregulation coming up that's going to be coming on the come line for buying power or building power, another term that you used is this is another term for selling power. Correct. PH5.96

BPA is not here to support any of this, but my question is, that we need to have addressed is, historically with BPA, that's the number one source customer that you're

looking at, what have they done historically; have they gone ahead and bought from a 49.9 megawatt plant? Or do they go ahead and -- I mean, is that historically what they do? Do they go ahead and want an up in the wattage?

MS. McCLENAHAN: This is considered to be a pilot project by BPA. In 1993 they did an EIS to look at their resource systems and what the mix of their power would be. And they decided that renewables should be a part of that mix.

And so what they did is decide they would go out to a few projects, and called them geothermal pilot projects, to see supplier contracts, to see if it worked, to have this geothermal electricity in their system.

And it's not a pilot project in that geothermal is experimental technology; there's two hundred forty megawatts down the coast of similar types of plants in southern California, that's in the Southern Cal. Edison grid. There is geysers, various plants in Nevada, but what they wanted to do is see how it worked for BPA. So what BPA did was put out an RFP for geothermal companies to develop these projects.

One of the projects was that Newberry, in the Deschutes National Forest in Oregon, and they entered into a contract to buy power there.

They're considering it here with Calpine, so they have entered into contracts, if that's what you're asking?

DEBRA MATHEWS: What it doesn't answer, Laurie, is

what Deschutes -- what is the size of the plants there they're purchasing?

MS. McCLENAHAN: It was a thirty megawatt plant, and also SBMA has not analyzed the environmental effects of their decision to buy the power. They can't enter into a contract with Calpine until they go through this process, and that's --

AUDIENCE MEMBER: How long has this been in place again on the geothermal? PH5.97

MS. McCLENAHAN: This isn't a plant up there.

MR. SHARP: There's no plant in Deschutes.

DORIS MOSS: // How many are in place like what we're talking about, how many geothermal power plants exist? //

MR. SHARP: BPA, there are none.

DORIS MOSS: In the pilot program, basically there's none; this would be the first one?

MS. McCLENAHAN: Right.

DORIS MOSS: Here we're back again, no real source of sale of it.

MS. McCLENAHAN: Again, they can't make the decision to buy the power until this environmental process is completed. They have said they're interested in there, and Calpine is going forward with the environmental process, but BPA cannot legally enter into a contract until the environmental effects have been analyzed and NEPA has been completed.

MARK MERRITHEW: Mark Merrithew. The environmental impact report was done by you, ma'am?

MS. McCLENAHAN: MHA.

MARK MERRITHEW: Who do you work for?

MR. SHARP: They are under contract with Calpine Corporation, and Calpine pays for them, but direction of how that document was prepared is --

MARK MERRITHEW: // I want to know, because I think the company that's trying to put in a geothermal -- and the company that does the environmental impacts where they are paying their wage, we could have a whole bias of the whole project. //

PH5.98

MR. SHARP: My professional opinion went into the document as well as Brad and Jim. You want to challenge them? Go ahead, sir.

MARK MERRITHEW: I'm making a statement --

MS. McCLENAHAN: The way the process works is the Forest Service went out to bid to get a contractor; we've done this several times before, acting as a third party contractor.

MARK MERRITHEW: I'm definitely not saying you're not capable, ma'am, that's not what I'm saying. I'm saying somebody has paid your, you know, wage, you know.

MS. McCLENAHAN: We did the initial draft; that was then received by Modoc or by Siskiyou National Forest, Siskiyou County Air Pollution Control District.

PHIL FACCHIN: Phil Facchin, cabin owner. We can beat this to death all day. // What we really need is you redo your book with the Forest Service. And now you guys got three hundred megawatt power plants or a power line; you can put six plants in.

Do your study with all six plants, that's what everybody is getting at, instead of doing it one at a time. Because once -- you know, we all know what's going to happen. I think you guys should go back to the drawing board, redo your book, and let's look at the whole overall project. If you're letting them go with one corridor and power the whole thing, let's just quit beating the bushes.

PH5.99

Do the whole thing, and then we'll review it. //

NIILO HYYTINEN: Niilo Hyytinen. // I was asking about this concern of how much money our area is going to get out of it, so I tried to, in my calculations on what was recommended -- was written in the paper.

If you break it down to over twenty years per year, the property tax would bring about sixty-five thousand a year for the entire area. I guess that would be Siskiyou County. And probably the power line going through Modoc, too, some.

PH5.100

And the royalty would -- according to the -- based on four million royalty for a portion, would amount to about twenty-two hundred -- thousand a year. So it's -- I was hoping that was all one year, but it's twenty years. Makes not quite so much. //

MR. SHARP: There was a possessory interest tax they were charging to the county; assesses that into the improvement.

Yes.

MARTHA SPENCER: Martha Spencer. // I have a question as to who ultimately makes the decisions, you know. It's supposedly Forest Service and BLM are the lead agencies, co-lead agencies. Who within the agency ultimately makes the decision at BLM? // PH5.101

MR. SHARP: It would be the Alturas Resource Manager. For Klamath, the Forest Service, the Klamath National Forest or Modoc, it would be the Forest Service and Modoc National Forest.

ERIC NELSON: Do you have the names of those --

MR. SHARP: I can give it. At Klamath it's Barbara Holder. Barbara Holder. Modoc is Diane Henderson-Bramlette, hyphenate B R A M L E T T E.

MARTHA SPENCER: // When we write a letter to you regarding our comments on the document, would it be worth our while to write to these people? // PH5.102

// I don't know whether or not they'll get a chance to review the comments or what, but I really -- I am in favor of the no-action alternative. // I think // that this area is so valuable that way, that it is for the future, and it really scares me to have a development like this in the area because I think it changes the whole ambience, I guess, if you want PH5.103 PH5.104

to save the area.

And I think when you're looking at public lands, that affects our entire nation, not just the power users or who are going to get to use the power physically; the entire nation.

I think it's important for us to be protecting it for future generations. I feel fortunate that I've been able to experience this my whole life, coming up to the area that offers so much. And it bothers me to think that we can change that so drastically with this development.

And California again does not have a lot of areas like this available. And I grew up in southern California, I saw the change down there. I just think for our future this is worth protecting. //

MR. SHARP: One more. Just in response, the BLM name is Scott Lawrence, he's acting area manager, was transferred into Alturas.

Let me -- in the back.

MARSHALL STAUNTON: Marshall Staunton again. // As a Tulelake farmer I use sulfur also, but based on the project proposed, I wouldn't want to buy that at this point. I think that the costs of developing this area far outweigh the benefits. I go to the Tulelake Rotary Meeting where I may not have the cost material for the power, the wholesale cost of the plants, but I think what was shown there, it was something like six cents per kilowatt hour. And I may be PH5.105

wrong and the wholesale market supposedly was two to two and a half.

And I have a brother-in-law that's in Sierra Pacific, and he was dealing with Canada and natural gas pipelines, and those have negative environmental consequences. Again, the cost is low and cheap, and it's forecasted to remain that way. So I would sure like to see, if we're discussing royalties, we're discussing all the issues, I'd like to see a discussion of the economics, because I don't think -- as I businessman, I don't think they're there.

And I'd like to see that brought out to the light of day.//

ERIC NELSON: I second that.

MR. SHARP: Name.

ANN SPENCER: Ann Spencer.//We talked and talked about money and impact, but we are really not talking about the future and about this particularly pristine area. And I sort of leave it to the Forest Service people. I think this is their responsibility to manage appropriately, and I do not think that these public lands will be managed appropriately if something like this comes in.

We're penny-wise and pound foolish. I can see forty years from now cleaning up the darn mess, but you will never go back to the pristine area where you were.

I think that we do not need this energy here, we do

PH5.106

not need this development here. And to do harm to an area that you can never get again is stupid. It is just plain stupid. And I doubt the morals of this.

And it's not for me, I've had mine; it's for our future generations and for two hundred years from now, it's for two thousand years from now.

Don't do something for today that has an effect that will last forever. And I feel it's your responsibility, I put the onus on the Forest Service's shoulders to make this appropriate decision to manage these lands for the benefit of the public for ages.//

BOB MEDLEY: Bob Medley from Redding. I'd like to make a comment.//Get lost in there. I've been coming up here about twenty-five years; this is a very, very special place. Finally built a cabin about two years ago; it has a spirit of the soul. This place that which very few places in my lifetime I've found. And I think it is a miracle, in the year 1997, this place has survived. Absolutely a miracle.

You try to think why it survived. I think two reasons: One, we're kind of isolated from any major population area; and number two is, there's been no commercial development. And we don't even have a grocery store. But even that's part of it. That's kind of kept us isolated, and it's kept everything the way it was.

I had a real fear that you could bring in this amount of industrial commercial activity and not tilt the

PH5.107

balance of this place.//

JANET SERVER: I have not been -- Mrs. Janet Server.//I have not been coming up near as long as some of you. However, I would like to invite the Calpines people, before they build anything, the big-wigs, the man who's going to sign the paychecks, come up here and spend a week. I would like to invite the Forest Service and BLM people to spend -- come up here and spend a week and tell me then that nothing will change.// PH5.108

BARBARA OBER: Barbara Ober.//I'm curious as to the final decision-making. This is a national forest; who can we contact at a national level to give my opinion?// PH5.109

MR. SHARP: The Forest Service that is the -- I mean, the hierarchy is the Forest Supervisor, then there's the Regional Forest in the San Francisco office, Sheila Greenleg, San Francisco, at 613 Sansom Street.

Then there's the Washington office, which is Mike Dombeck.

BARBARA OBER: Is that under the Department of Agriculture?

MR. SHARP: Department of agriculture. BLM, it's Alturas, the manager is -- the position there is State Director, Ed Hasting, and there is a new Director of BLM, who is just -- I remember the -- but I don't know who the new one is; came in the last two or three months.

MARTHA SPENCER: That information is in the EIR?

MR. SHARP: I doubt the addresses are in the EIR, only in the --

MARTHA SPENCER: The book isn't going to tell us anything?

MR. SHARP: Give us a name and address, we will send it to you.

BARBARA OBER: Is the consulting agency doing both or are both plants by two different ones?

MR. SHARP: Different consulting firms.

Name?

BARRY OHLUND: Barry Ohlund.// Probably a silly question but one that's haunted me, so I'd like to have it answered. I don't know how geothermal is actually -- the process is done, how it's drilled down and so forth, but possibly one of the fears that I have is that it taps some volcanic tube and drains our lake.

What are the safeguards? This is pointed towards the Calpine people; what safeguards, or even monetary safeguards are you willing to do for the property owners that are sitting in front of you in case something like this happens? Do you have -- you have nothing to lose; we have everything to lose; this is irreplaceable.// PH5.110

MR. MERRIHEW: I don't know how to answer that question. The hydrology section, I think, is adequate. We don't believe that there's a lava tube, if you will, connecting where we are in Medicine Lake, or Medicine Lake

wouldn't be there, it would be in the tube. We believe it -- there's no connection, and when we drilled down in the geothermal reservoir, we case in cement to meet the BLM standard for drilling in order to get a permit.

Let me back that up. We have to define our drilling procedure in order to get a drilling permit, which has to meet their standards in order for us to drill.

And we don't believe at all that we will -- there's any connection whatsoever with the lake itself to where we --

BARRY OHLUND: Sorry, you're not answering my question. My question is, what are you willing to safeguard us monetarily with? PH5.111

MR. MERRIHEW: You're talking to the guy at the bottom of the totem pole. You need to talk to somebody who's -- but Calpine can't stand here to guarantee a monetary compensation or anything. If something happens to the lake, if you're -- that's what you're suggesting, I don't have that kind of authority.

BARRY OHLUND: I'm suggesting, sir, I'm suggesting that a trust -- PH5.112

AUDIENCE MEMBER: A bond or trust.

MR. MERRIHEW: We have a nationwide bond with the federal government for these kinds of actions, but if you're asking for Calpine --

MR. SHARP: We will note that in the record.

BARRY OHLUND: Can you understand why my question

is there?

MR. SHARP: We'll note it in the record. We're kind of -- we scheduled to go to 12:00 o'clock and I'm kind of -- we could be here for another two hours, I'm sure. But if there's a pressing -- I'd like to end with the lady that started it.

LOUISE THOMPSON: What I'd like to do with this, Randy, is just before we go, is that I'd like to put it on record, with the vote of the home owners' membership, that we extend the comment period to this as a whole, the members, to October 31st, and then an economic based statement be forwarded to the Home Owners Association for study. PH5.113

MR. SHARP: October 31st, you said.

MARK MERRITHEW: I do want to make one quick statement. Just forget all the home owners, doing a census at the campgrounds, and there have been people from all over the world have come up here. And they said they wouldn't come back if this goes in. PH5.114

It's a special spot not just for the home owners; this is for everyone; the human race. How is that?

MR. SHARP: I would like to finish out with the --

LOUISE THOMPSON: I would make a vote, Randy, first. The comment period for talk, October 30th. We also would like an economic impact report forwarded to the Home Owner's Association. PH5.115

MS. McCLENAHAN: Can I ask a question? You said an

economic impact report. Do you mean the final environmental impact statement?

LOUISE THOMPSON: I meant economic impact -- economic report.

MS. McCLENAHAN: You want an economic impact analysis.

LOUISE THOMPSON: I want to make one more statement about the BPA buying this power. I attended the August 7th meeting, and there was a representative of that group there. She said that they do not need this power, they have no obligation to buy the power, until this EIS is approved, and that it would just be a notch in their belt. PH5.116

Are we willing to trade this wonderful area to put a notch in Bonneville Power's belt? I think not.

MR. SHARP: One more important comment.

AUDIENCE MEMBER: Who is making the final decision; does it happen to be you, someone in Annapolis; everybody involved, the Board of Supervisors, the BLM, Forest Service; or is it just up to the BLM to make the final decision? PH5.117

MR. SHARP: To make it a viable project, it has to be all; everybody has to approve the project. You can't build a power plant without a transmission line; to get a transmission line you need to get across-the-board Forest Service.

You can't build your power plant until you get an air quality control permit, their permit. There has to be

agreement, you can't get one component and railroad it through.

AUDIENCE MEMBER: That's what I want to know.

MS. SPENCER: I think it would be helpful for the public record if we could get an idea of the number of people here that oppose this project, so that we could get that number so -- compared to other public meetings.

I don't know. Seventy-five people here, whatever. Seventy-five? And of that seventy-five, I don't know how many people, but I would like a show of hands. I think most of us are opposed to the project, and would go on record proposing the last alternative, which is no project. PH5.118

Hands up.

MR. SHARP: Those for it, raise your hand.

LOUISE THOMPSON: I think that, Susan, is that maybe what we could do, once we get the economic impact statement and get it, we will make an effort, Carl and I, to get it copied and out to everyone, and then what we can do on the comment sheet, on that, is place our comments again and -- with yea and no, to forward those back and the Association is going to be more working -- I know Marshall and myself at Tulelake and John can help with it, forward all of that data to the correct government agencies for comment.

In a way, you've got a little bit more -- you've got this one that we have not all read, and we've not seen any economic plan on it, so we can at least get our comments

on that and get them forwarded.

MR. SHARP: Thank you. Thank you for hosting it.

(The public comment portion of the hearing was concluded.)

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COURT REPORTER'S CERTIFICATE

This is to certify that I, MICHELE D. DANCER, a Certified Shorthand Reporter of the State of California, was present at the time and place the foregoing proceedings were had and taken in the within matter; and that as such shorthand reporter I did take down in shorthand writing the aforementioned proceedings; and afterwards caused my said shorthand writing to be transcribed into typewriting, and the foregoing pages beginning at the top of Page 1 through Page 69 to be a full, true, correct and complete transcription of my said shorthand notes.

DATED: This 24th day of September of 1997.

MICHELE D. DANCER, CSR No. 9199

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2: COMMENT INDEX

2: COMMENT INDEX

2.1 Comments and Responses Organization

COMMENTS

A total of 270 comment letters were received on the Draft EIS/EIR. Most of the letters contained several comments on a variety of topics. Additional comments were made at the five public hearings that were held after the Draft EIS/EIR was published. Each comment letter or source has been assigned an alphabetical designation for easy reference (see Section 2.1 of this document). After the 24th letter (Letter "Z"), the code continues as "AA, AB, AC, ..." and so on. Letters were ordered alphabetically in three broad categories, in the following order:

1. Comment letters from regulatory agencies
2. Comment letters from other organizations
3. Comment letters from individuals

Each comment in each letter was assigned a number code. Thus, each comment has a unique alphanumeric code, representing the comment letter (the letter code) and the individual comment within each letter (the number code). For example, the third comment in the second letter would have the code "B.3."

Many of the comments received addressed the same topic (e.g., potential for effects on Fall River Mills water quality and quantity). The lead agencies determined that the most effective way to respond to the comment letters was to group individual comments by topic area, rather than to respond separately to each comment letter. This format is intended to provide readers with a more comprehensive and concise discussion of each topic area.

Comment letters were converted to electronic form by scanning or typing. The content of each letter was fully preserved. Individual comments in each letter were then separated and categorized by broad environmental parameter (e.g., hydrology, vegetation, etc.). The comments were then grouped by these parameters. In many cases, comments addresses several topics at once (i.e., in the same sentence). In these cases, comments were assigned to the primary environmental topic addressed. In cases where there was no primary comment (e.g., a list of topics), the comment was assigned the topic that appeared first in the sentence. Within each environmental topic, the comments were further organized into subtopics addressing specific areas of each environmental parameter (e.g., "Effects of Well Venting on Vegetation").

ORGANIZATION OF COMMENTS

The environmental parameters are presented in the same order in which they appear in the EIS/EIR. Subtopics are then organized within each environmental parameter. For each subtopic, there are two sections: comments (organized alphabetically and numerically), and their responses. The Comment Index provides a listing of comment letters with corresponding alphabetical designations, as well as numeric designations for each individual comment.

RESPONSES

The responses address all individual comments. The text of the responses was written to provide a thorough discussion of the issues raised by the comments, rather than segmented answers to isolated issues. Where appropriate, responses reference specific comments by alphanumeric designation (e.g., "In response to comment A.9,...") in order to address specific issues.

2.2 How to Find Your Comments

The index is organized alphanumerically. For each comment, its comment number and the name of the commentor is identified, the section of Volume III in which the comment is located is provided, and the page number on which the comment is located is identified.

1. Turn to the Comment Index in this chapter (the Comment Index also appears in Chapter 7 of Volume III which contains the responses to comments on the Draft EIS/EIR). The pages of the index are tan for easy identification.
2. Find your name or the name of your organization (alphabetized). Please note that letters IV through JJ were received after the comment period had ended, and are therefore not alphabetical with the rest of the letters.
3. Identify your letter's letter designation (e.g., Q, AL, BA, JJ, etc.).
4. Find your comment letter in this volume (the table of contents identifies the page on which the letters begin), which contains all original comments letters with individual comments identified by the letter designation and number.
5. Using the Comment Index, identify the page number on which your comments appear.
6. Turn to the pages in Volume III where your comments are located. The responses will follow the comments.

2.3 Comment Index

Note: Comments can be found in Chapter 3, unless otherwise indicated.

Deanna M. Weiman, U.S. Environmental Protection Agency

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A.5	Project Preference (Chapter 5)	15
A.6	Traditional Cultural Values	261
A.7	General Comments (Chapter 6)	3
A.8	NEPA/CEQA Issues (Chapter 4)	11
A.9	Hydrology	119
A.10	NEPA/CEQA Issues (Chapter 4)	11
A.11	Alternatives, Including the Proposed Action	67
A.12	Alternatives, Including the Proposed Action	68
A.13	Project Preference (Chapter 5)	15
A.14	General Comments (Chapter 6)	6
A.15	Project Preference (Chapter 5)	15
A.16	General Comments (Chapter 6)	7
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A.18	Socioeconomics	645
A.19	Hydrology	126
A.20	Hydrology	119
A.21	Hydrology	133
A.22	Hydrology	133
A.23	Hydrology	130
A.24	Hydrology	91
A.25	Hydrology	98
A.26	Hydrology	91
A.27	Hydrology	179
A.28	Cumulative Effects	680
A.29	Hydrology	157
A.30	Hydrology	102
A.31	Hydrology	126
A.32	Hydrology	130
A.33	Hydrology	204
A.34	Alternatives, Including the Proposed Action	48
A.35	Hydrology	98
A.36	Hydrology	91
A.37	Hydrology	91
A.38	Geology and Soils	74
A.39	Geothermal Resources	214
A.40	Cumulative Effects	677
A.41	Alternatives, Including the Proposed Action	66
A.42	Cumulative Effects	686
A.43	Introduction and Purpose and Need	25
A.44	Cumulative Effects	680
A.45	Cumulative Effects	697
A.46	Air Quality	531

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Note: Comments can be found in Chapter 3, unless otherwise indicated.		
A.47	Air Quality	542
A.48	Air Quality	503
A.49	Air Quality	542
A.50	Human Health and Safety	623
A.51	Human Health and Safety	640
A.52	Hydrology	134
A.53	Alternatives, Including the Proposed Action	68
A.54	Human Health and Safety	616
A.55	Human Health and Safety	612
A.56	Vegetation	314
A.57	Introduction and Purpose and Need	10
A.58	Human Health and Safety	618
A.59	Hydrology	98
A.60	Alternatives, Including the Proposed Action	63
A.61	Noise	595
A.62	Wildlife	343
A.63	Socioeconomics	650
A.64	Traditional Cultural Values	268
Ronald A. Iverson, U.S. Fish and Wildlife Service		
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B.5	Other Statutory Sections	706
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B.9	Wildlife	330
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B.11	Wildlife	347
B.12	Vegetation	312
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B.14	Wildlife	326
B.15	Wildlife	384
B.16	General Comments (Chapter 6)	4
B.17	Wildlife	342
B.18	Wildlife	342
B.19	Wildlife	342
B.20	Wildlife	343
B.21	Hydrology	194
B.22	Wildlife	380
Julie Donnelly-Nolan, U.S. Geological Survey		
C.1	Geology and Soils	75
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Richard L. Elliot, California Department of Fish and Game		
D.1	Vegetation	302
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Comment #	Volume III Section	Volume III Page
Note: Comments can be found in Chapter 3, unless otherwise indicated.		
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D.5	Hydrology	194
D.6	Wildlife	345
D.7	Cumulative Effects	659
Richard D. Barnum, Siskiyou County Planning Department		
E.1	NEPA/CEQA Issues (Chapter 4)	1
E.2	Air Quality	486
E.3	NEPA/CEQA Issues (Chapter 4)	1
E.4	NEPA/CEQA Issues (Chapter 4)	9
E.5	General Comments (Chapter 6)	33
John R. Hannum, North Coast Regional Water Quality Control Board		
F.1	Introduction and Purpose and Need	23
F.2	Hydrology	168
F.3	Human Health and Safety	621
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F.5	Geothermal Resources	216
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F.14	Geothermal Resources	207
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F.19	Hydrology	169
F.20	Hydrology	102
F.21	Alternatives, Including the Proposed Action	50
F.22	Hydrology	191
F.23	Hydrology	165
F.24	NEPA/CEQA Issues (Chapter 4)	2
F.25	Geothermal Resources	214
F.26	Geothermal Resources	214
Cherilyn E. Widell, State Office of Historic Preservation		
G.1	Cultural Resources	228
American Motorcyclist Association		
H.1	General Comments (Chapter 6)	15
H.2	NEPA/CEQA Issues (Chapter 4)	2
H.3	Cumulative Effects	677
H.4	General Comments (Chapter 6)	15
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H.18	Land Use and Recreation	462
H.19	Land Use and Recreation	460
H.20	Land Use and Recreation	461
H.21	Cumulative Effects	697
H.22	Transportation	475
H.23	Land Use and Recreation	462
H.24	Land Use and Recreation	462
H.25	Visual Quality	392
H.26	Cumulative Effects	696
H.27	Visual Quality	392
H.28	Noise	563
H.29	Noise	600
H.30	Noise	610
H.31	Noise	593
H.32	Cumulative Effects	698
H.33	General Comments (Chapter 6)	37
H.34	Noise	579
H.35	NEPA/CEQA Issues (Chapter 4)	11
H.36	Project Preference (Chapter 5)	15
H.37	Project Preference (Chapter 5)	5
H.38	General Comments (Chapter 6)	4
Dale R. Schuster, CalEnergy International Ltd.		
I.1	Project Preference (Chapter 5)	17
I.2	General Comments (Chapter 6)	34
Vivian Parker, California Native Plant Society		
J.1	Project Preference (Chapter 5)	5
J.2	Vegetation	278
J.3	General Comments (Chapter 6)	15
J.4	Vegetation	318
J.5	Vegetation	306
J.6	Vegetation	278
J.7	Vegetation	284
J.8	Cumulative Effects	687
J.9	Vegetation	302
J.10	Vegetation	307
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Ryan Henson, California Wilderness Coalition		
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K.10	Plans and Policies	427
K.11	Plans and Policies	434
K.12	Vegetation	303
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K.14	Project Preference (Chapter 5)	3
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Steve Tabor, Desert Survivors		
L.1	Project Preference (Chapter 5)	5
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Rick Poore, et al., Fall River Resource Conservation District		
M.1	General Comments (Chapter 6)	5
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M.5	Hydrology	119
M.6	Hydrology	119
M.7	Geothermal Resources	212
M.8	Hydrology	141
M.9	NEPA/CEQA Issues (Chapter 4)	14
M.10	Hydrology	93
M.11	NEPA/CEQA Issues (Chapter 4)	2
Robert J. Baiocchi, Fall River Wild Trout Foundation		
N.1	NEPA/CEQA Issues (Chapter 4)	6
N.2	Introduction and Purpose and Need	11
N.3	Introduction and Purpose and Need	12
N.4	Hydrology	86
N.5	Wildlife	339
N.6	Cumulative Effects	681
N.7	Hydrology	141
N.8	Cumulative Effects	681
N.9	Wildlife	378
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N.11	Traditional Cultural Values	250
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N.17	Visual Quality	408
N.18	Visual Quality	396
N.19	Air Quality	486
N.20	Human Health and Safety	627
N.21	Vegetation	297
N.22	Vegetation	310
N.23	Vegetation	297
N.24	Hydrology	157
N.25	Wildlife	334, 384
N.26	Cumulative Effects	693
N.27	Cumulative Effects	693
N.28	Land Use and Recreation	464
N.29	Wildlife	347
N.30	Wildlife	326
N.31	Cumulative Effects	693
N.32	Wildlife	326
N.33	Wildlife	326
N.34	Introduction and Purpose and Need	31
N.35	Alternatives, Including the Proposed Action	68
N.36	Alternatives, Including the Proposed Action	63
N.37	NEPA/CEQA Issues (Chapter 4)	2
N.38	General Comments (Chapter 6)	5
N.39	General Comments (Chapter 6)	2
Katherine Kowatch, Friends of the River		
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O.5	Hydrology	119
O.6	Geology and Soils	80
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O.8	Plans and Policies	437
O.9	Visual Quality	410
O.10	Wildlife	378
O.11	Wildlife	335
O.12	Wildlife	369
O.13	Wildlife	361
O.14	Wildlife	355
O.15	Vegetation	301
O.16	Vegetation	296
O.17	Vegetation	307
O.18	Vegetation	308
O.19	Geology and Soils	83
O.20	Vegetation	311
O.21	Traditional Cultural Values	254
O.22	Project Preference (Chapter 5)	3

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Carol Logan, Kalapooya Sacred Circle Alliance		
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Klamath Forest Alliance		
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Q.4	Vegetation	321
Q.5	Wildlife	343
Q.6	Plans and Policies	438
Q.7	Traditional Cultural Values	263
Q.8	Project Preference (Chapter 5)	5
Q.9	Project Preference (Chapter 5)	3
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Q.11	Project Preference (Chapter 5)	3
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The Klamath Tribes		
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R.5	General Comments (Chapter 6)	15
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Lawrence Livermore National Laboratory		
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S.3	Hydrology	205
Medicine Lake Citizens for Quality Environment		
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T.3	General Comments (Chapter 6)	15
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T.8	NEPA/CEQA Issues (Chapter 4)	8
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T.20	Wildlife	353
T.21	NEPA/CEQA Issues (Chapter 4)	2
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Medicine Lake Citizens for Quality Environment		
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U.4	Hydrology	87
U.5	Hydrology	169
U.6	Hydrology	165
U.7	Hydrology	138
U.8	Hydrology	161
U.9	Hydrology	194
U.10	Hydrology	134
U.11	Wildlife	380
U.12	Hydrology	195
U.13	Land Use and Recreation	450
U.14	Land Use and Recreation	467
U.15	Land Use and Recreation	457
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U.18	Air Quality	539
U.19	Air Quality	546
U.20	Air Quality	487
U.21	Air Quality	488
U.22	Human Health and Safety	621
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U.24	Geology and Soils	83
U.25	Cumulative Effects	659
U.26	General Comments (Chapter 6)	16
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V.6	Noise	573
V.7	Noise	569
V.8	Noise	596
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V.18	Cumulative Effects	699
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V.20	Cumulative Effects	70
V.21	Cumulative Effects	701
V.22	Introduction and Purpose and Need	16
V.23	Introduction and Purpose and Need	21
V.24	Air Quality	549
V.25	Cumulative Effects	660
V.26	Introduction and Purpose and Need	17
V.27	Air Quality	549
V.28	Air Quality	550
V.29	Air Quality	482
V.30	Air Quality	477
V.31	Air Quality	478
V.32	Noise	587
V.33	Air Quality	478
V.34	Air Quality	438
V.35	Air Quality	438
V.36	Air Quality	540
V.37	NEPA/CEQA Issues (Chapter 4)	16
V.38	General Comments (Chapter 6)	4
V.39	Project Preference (Chapter 5)	11
Medicine Lake Citizens for Quality Environment		
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W.2	Cumulative Effects	660
W.3	Land Use and Recreation	451
W.4	General Comments (Chapter 6)	16
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W.6	Project Preference (Chapter 5)	13
Mount Shasta Area Audobon Society Board of Directors		
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X.2	Wildlife	335
X.3	Vegetation	310
X.4	Vegetation	314
X.5	Vegetation	301
X.6	Vegetation	311
X.7	Wildlife	355
X.8	Wildlife	363
X.9	Wildlife	370
X.10	Wildlife	345
X.11	Geology and Soils	83
X.12	NEPA/CEQA Issues (Chapter 4)	21
Mount Shasta Bioregional Ecology Center		
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Y.4	General Comments (Chapter 6)	7
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Y.6	Land Use and Recreation	467
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Y.8	General Comments (Chapter 6)	16
Y.9	Introduction and Purpose and Need	3
Y.10	Introduction and Purpose and Need	31
Y.11	Cumulative Effects	660
Y.12	Introduction and Purpose and Need	6
Y.13	General Comments (Chapter 6)	16
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Y.15	NEPA/CEQA Issues (Chapter 4)	17
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Y.20	Introduction and Purpose and Need	31
Y.21	NEPA/CEQA Issues (Chapter 4)	8
Y.22	NEPA/CEQA Issues (Chapter 4)	3
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Y.24	Wildlife	329
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Y.26	Hydrology	87
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Y.30	Wildlife	380
Y.31	Hydrology	169
Y.32	Air Quality	486
Y.33	Air Quality	546
Y.34	Visual Quality	396
Y.35	Visual Quality	411
Y.36	Visual Quality	392
Y.37	Visual Quality	408
Y.38	Noise	563
Y.39	Wildlife	344
Y.40	Plans and Policies	415
Y.41	Traditional Cultural Values	254
Y.42	Plans and Policies	415
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Y.44	Plans and Policies	419
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Y.57	NEPA/CEQA Issues (Chapter 4)	3
Y.58	Alternatives, Including the Proposed Action	72
Y.59	General Comments (Chapter 6)	16
Y.60	Alternatives, Including the Proposed Action	72
Y.61	NEPA/CEQA Issues (Chapter 4)	14
Y.62	Project Preference (Chapter 5)	3
Mount Shasta Sno-mobilers Inc.		
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Mount Shasta Tomorrow		
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Native Coalition for Cultural Restoration of Mount Shasta		
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AB.5	General Comments (Chapter 6)	7
AB.6	Introduction and Purpose and Need	6
AB.7	Traditional Cultural Values	254
AB.8	Project Preference (Chapter 5)	3
AB.9	General Comments (Chapter 6)	14
North Coast Environmental Center		
AC.1	Project Preference (Chapter 5)	6
AC.2	Traditional Cultural Values	252
AC.3	Plans and Policies	432
AC.4	Traditional Cultural Values	251
AC.5	Project Preference (Chapter 5)	13
Pit River Tribe		
AD.1	Project Preference (Chapter 5)	6
AD.2	Traditional Cultural Values	261
AD.3	Traditional Cultural Values	252
AD.4	NEPA/CEQA Issues (Chapter 4)	18
AD.5	Cultural Resources	229
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DT.6	Introduction and Purpose and Need	33
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EB.1	Project Preference (Chapter 5)	8
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EB.3	Project Preference (Chapter 5)	14
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Langner, Mark		
EE.1	Project Preference (Chapter 5)	8
EE.2	General Comments (Chapter 6)	9
Larsen, Bill		
EF.1	Socioeconomics	650
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McDermos, Joan		
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EZ.3	Land Use and Recreation	450
EZ.4	Project Preference (Chapter 5)	8
McLaughlin, Bob		
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FA.2	General Comments (Chapter 6)	1
Medley, Robert		
FB.1	General Comments (Chapter 6)	23
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FB.4	Project Preference (Chapter 5)	8
FB.5	General Comments (Chapter 6)	23
Mikec, John W.		
FC.1	Project Preference (Chapter 5)	8
FC.2	Introduction and Purpose and Need	7
FC.3	General Comments (Chapter 6)	23
Miller, H.K. "Bud"		
FD.1	Air Quality	530
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FD.3	Socioeconomics	651
FD.4	General Comments (Chapter 6)	34
Miller, Ray		
FE.1	Wildlife	339
Miller, Victoria K.		
FF.1	General Comments (Chapter 6)	23
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FI.1	Project Preference (Chapter 5)	8
FI.2	General Comments (Chapter 6)	23
Moiher, Carolyn J.		
FJ.1	Project Preference (Chapter 5)	8
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FJ.3	Traditional Cultural Values	252
FJ.4	General Comments (Chapter 6)	23
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FK.6	Hydrology	138
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FL.1	Socioeconomics	648
Mulvaney, Ana		
FM.1	Project Preference (Chapter 5)	12
FM.2	Hydrology	130
FM.3	Wildlife	335
FM.4	Human Health and Safety	622
FM.5	Air Quality	530
FM.6	Project Preference (Chapter 5)	12
Myers, Bart and Pamela		
FN.1	Project Preference (Chapter 5)	8
FN.2	General Comments (Chapter 6)	23
Nelson, Eric T.		
FO.1	Project Preference (Chapter 5)	4
FO.2	General Comments (Chapter 6)	10
FO.3	General Comments (Chapter 6)	23
FO.4	NEPA/CEQA Issues (Chapter 4)	15
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FP.19	Air Quality	519
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FP.21	Cumulative Effects	678
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FQ.2	Project Preference (Chapter 5)	12
Norman, Julie		
FR.1	Project Preference (Chapter 5)	8
FR.2	General Comments (Chapter 6)	24
FR.3	General Comments (Chapter 6)	35
Norris, Frank		
FS.1	Project Preference (Chapter 5)	13
Olson, Claude		
FT.1	Project Preference (Chapter 5)	18
FT.2	Project Preference (Chapter 5)	18
FT.3	Project Preference (Chapter 5)	18
Orr, Olga E.		
FU.1	General Comments (Chapter 6)	24
FU.2	General Comments (Chapter 6)	10
FU.3	General Comments (Chapter 6)	24
FU.4	Introduction and Purpose and Need	7
FU.5	Project Preference (Chapter 5)	13
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FV.1	Project Preference (Chapter 5)	15
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Perlman, S.		
FY.1	Project Preference (Chapter 5)	9
Petterson, Katherine		
FZ.1	Project Preference (Chapter 5)	9
FZ.2	General Comments (Chapter 6)	2
FZ.3	Hydrology	117
FZ.4	General Comments (Chapter 6)	35
FZ.5	Project Preference (Chapter 5)	13
Phillips, Antoinette C.		
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GA.2	Project Preference (Chapter 5)	15
Pierson, Elizabeth D.		
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GC.1	Project Preference (Chapter 5)	9
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GC.5	Introduction and Purpose and Need	7
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Plumb, Dolores		
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GD.2	Plans and Policies	433
GD.3	General Comments (Chapter 6)	35
GD.4	General Comments (Chapter 6)	4
Pohlman, Sami Jo		
GE.1	Project Preference (Chapter 5)	9
GE.2	Traditional Cultural Values	251
Poaler, Sarah		
GF.1	General Comments (Chapter 6)	10
GF.2	Alternatives, Including the Proposed Action	41
GF.3	General Comments (Chapter 6)	24
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GG.2	Project Preference (Chapter 5)	15

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