As development wells will largely utilize existing pads and access, anticipated impacts are similar but on a much smaller scale than for that of exploration. The installation of power plants will require a large amount of land. However, as 80 to 90 percent of the land required will remain relatively undisturbed, it may be possible to optimize the areas of heavy disturbance with regard to conflict with cultural resources. Since most prehistoric sites are small, flexibility in the placement of pipeline systems and power transmission towers should allow site avoidance.

Abandonment of facilities involves some contouring and re-landscaping facilities areas. Activity should be restricted to the originally disturbed area to avoid potential impacts to cultural resources.

Potential impacts to cultural resources will be mitigated by measures requiring avoidance and or additional survey and testing to determine importance of resources. These measures apply to all phases of the project during which ground disturbance will occur:

- Since steep slopes and dense vegetation precluded intensive physical survey of all land surfaces, it is recommended that additional survey be conducted in these areas on a site-specific basis once areas to be impacted by development are identified (FEIR Mitigation Measure #1).

- Wherever possible, sites of possible cultural interest shall be avoided through redesign of facilities (FEIR Mitigation Measure #2).

- Minimum mitigation measures for all sites to be impacted shall include initial testing (excavation) to determine whether subsurface deposits exist, and collection and mapping of representative lithic debris and all formal tools. An "enhanced" inventory method incorporating these procedures has been developed (Fredrickson, 1985) which would also allow for evaluation of research potential for recorded sites. As these procedures determine presence or absence of subsurface deposits, permit an age estimate and age range of site use (through obsidian hydration) and provide site-type analysis, Fredrickson estimates that impact mitigation for approximately 50 percent of all prehistoric sites could be accomplished at this stage. This would include virtually all surface lithic scatters (FEIR Mitigation Measure #3).

- For sites with subsurface deposits, further testing (formal excavation) shall be required, with results of initial testing serving as basis for a research design. For many of these sites (estimated by Fredrickson at 25 percent of the total), information potential would be realized at this stage (FEIR Mitigation Measure #4).

- Another 25 percent of sites is estimated to have the potential to address additional significant research questions. For these remaining sites with a high level of significance (e.g., those with midden and/or structural remains), avoidance may become a reasonable alternative. According to Fredrickson (1985), lithic sites that yielded particularly important material (e.g., Paleoindian or Lower Archaic) would be included in this category (FEIR Mitigation Measure #5).

- o Where a potential for buried sites exists, construction activities shall be monitored by qualified individuals. Should buried resources be discovered, grading or construction activities will be redirected until a determination of importance can be made by the monitor (FEIR Mitigation Measure #6).

- o The Native American Commission will be informed prior to any construction in areas of known or suspected cultural resource sensitivity (FEIR Mitigation Measure #7).

PALEONTOLOGICAL RESOURCES: Exploratory Drilling, Field Development, Operation and Maintenance Activities, and Abandonment Phases

Impact: As with cultural resources, significant adverse impacts to paleontological resources could occur during any phase of the project where ground disturbance will occur.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies. (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

Any ground disturbing activities could result in potential impacts to fossil resources. In that many of the fossil specimens known to occur in the area are relatively common in terms of assemblage and taxa, significance is attributed to the less common resources. Given the importance of resources which are known in the area, substantial adverse impacts to rare or high interest resources is not predicted. However, the potential does exist, thus, the impact is categorized as significant and will be mitigated by conducting additional surveying and monitoring of construction during appropriate development activities.

- o For each specific sublease area, a qualified paleontologist shall be retained by the applicant to develop a program of onsite monitoring of significant paleontologic resources including fresh exposures, bulk sample screening, and salvage of specimens. This program shall include a literature and records search to assess specific areas of sensitivity to fossil resources. A paleontologic resource sensitivity map of the project area can then be prepared showing the paleontologic importance of each rock unit to be exposed as well as the overall paleontologic sensitivity (FEIR Mitigation Measure #8).

- o An excavation monitoring program designed to locate and salvage significant paleontological resources. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed to avoid construction delays and to remove samples of sediments

which are likely to contain the remains of small mammals. The monitor shall be empowered to temporarily halt or divert grading equipment to allow removal of abundant or large specimens. Sediment samples may be removed in bulk to off-site screening locations (FEIR Mitigation Measure #9).

- o Recovered specimens shall be prepared to the point of identification (FEIR Mitigation Measure #10).

- o Specimens shall be curated into an established repository (FEIR Mitigation Measure #11).

- o Preparation of a report of findings with an appended itemized inventory of specimens and taxa. The report and inventory, when submitted to the appropriate lead agency, signifies completion of the paleontologic resource impact mitigation program (FEIR Mitigation Measure #12).

CULTURAL AND PALEONTOLOGICAL RESOURCES: Cumulative Impacts

Impact: Areas to be developed under the cumulative scenario will contain cultural and paleontological resources which may be inadvertently adversely affected by geothermal activities.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies. (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects. Undoubtedly, areas to be developed under the cumulative scenario will contain cultural resources which may be inadvertently, adversely affected by such activities as non-drilling exploration where ground disturbance, but no formal grading is involved. Impacts to cultural and paleontological resources can be mitigated by conducting field studies of potential project sites prior to grading activities or by having cultural and paleontological resource experts monitor grading or exploration activities as proposed on a site-specific basis.

Mitigation for significant cumulative impacts to cultural and paleontological resources are the same as those listed for site-specific impacts.

Mitigation for significant cumulative impacts to cultural and paleontological resources are the same as those listed for site-specific impacts.

TRANSPORTATION: Exploratory Drilling

Impact: Traffic generation under exploratory drilling phases is potentially significant from the standpoint of creation of to existing rural traffic.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Caltrans).

Facts Supporting the Finding:

During the exploration phase the drill rig and all support equipment and structures are transported to the drill site. Frequent heavy vehicle traffic includes delivery and removal of equipment and supplies, delivery of well casings, delivery of water, and removal of geothermal wastes and sewage. It is estimated that 50 to 60 trips per day per will occur during the 6 to 12 month exploratory drilling phase. This figure includes both light and heavy vehicle traffic.

The following mitigation measure to provided safety measures for equipment transportation over local roads have been adopted to reduce adverse exploratory phase transportation impacts to insignificant levels:

- To reduce hazards, oversized vehicles should be preceded and followed by warning vehicles as required by state and county regulations. In addition, when existing road conditions dictate, specific routing and restricted time of operation may be required on certain roadway segments (FEIR Mitigation Measure #1).

- Potential conflicts can be reduced with development project trucking scheduled to avoid hours of greatest potential conflict, e.g. school bus runs (FEIR Mitigation Measure #2).

- Overall traffic volumes can be reduced through high occupancy vehicle measures, e.g., car pooling, project buses (FEIR Mitigation Measure #3).

- The lessee/operator should provide to its contractors and vendors a detailed map of the area for distribution to truck drivers. The map shall include a) all dangerous curves/elevation points highlighted in red, b) speed limits/reduced limits depicted on the map, c) safe locations for vehicle inspections, and d) a serious warning clause/penalties

if drivers violate any safety procedures while traveling on leasehold roads (FEIR Mitigation Measure #4).

- o Due to the poor conditions of roads in The Geysers area, it is recommended that road reconstruction should occur prior to the start of geothermal development construction. Otherwise, nondesign traffic loads will exacerbate existing conditions (FEIR Mitigation Measure #5).

TRANSPORTATION: Field Development

Impact: The initial field development activities will generate significant and adverse levels of traffic, though the duration of impact is short-term.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Caltrans).

Facts Supporting the Finding:

Production drilling generates transportation-related movement of drill rigs, drilling crews and necessary equipment to the well site. The California Energy Commission transportation study (1981) estimated that 35 semi-trailer loads are required over a 3-day period to move the equipment needed for setting up one drill rig. Transport of equipment and supplies will generate daily traffic levels of 900-kg (1-ton) truck traffic (3-4 trips), car traffic from drilling crews, supervisory and administrative personnel (20-30 trips). Casing deliveries are normally made in 1,814-kg (20-ton) loads, sporadically throughout the first 40-60 days of drilling operations. Another 10 to 12 trips per day are made to delivery water and haul wastes.

Well field development generates more traffic than any other phase of geothermal development. From 80 to 100 trips per day are generated over the 24 to 36 month typical well field development period for a power plant.

The power plant construction phase of development has the greatest impact on the transportation network in terms of loads. Steam turbines weighing up to 90,720 kg (100 tons) or more are transported to the geothermal sites during this phase. Overload permits are required for these loads. The volume of tractor trailer rigs and trucks hauling heavy equipment to the site also increases during this phase. This type of traffic causes congestion and safety problems where these vehicles must cross the roadway centerline to negotiate turns. The transport of construction personnel is also at its peak during this phase. Power plant construction activities normally involve 20 to 40 trips per day over a 36-month construction period.

The following mitigation measure encouraging use of local and county sources of services for geothermal projects have been adopted to reduce adverse exploratory related transportation impacts to insignificant levels:

- o All measures included in Exploratory Drilling are applicable to Field Development (FEIR Mitigation Measure #6).

- o A transportation permit from Caltrans is required for all loads on state highways which exceed established limits as to width, height, and weight.

- o The geothermal industry is encouraged to use local contracts and services, and to purchase material equipment, and supplies from sources within the county (FEIR Mitigation Measure #7).

TRANSPORTATION: Operation and Maintenance

Impact: The operation and maintenance activities will potentially generate significant and adverse levels of traffic during the life of project operations.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Caltrans).

Facts Supporting the Finding:

Power plant operations and well field maintenance typically generate 30 to 50 trips per day over the life of any one geothermal power plant and well field development project.
This level of traffic is much less than during the field development phase.

Impacts from traffic generation during this phase are mitigated by encouraging employees to ride the commuter buses provided specifically for geothermal industry workers in The Geysers or to carpool, as follows:

- o To reduce project-generated traffic levels, employee car pools or use of the geothermal worker commuter bus system should be established (FEIR Mitigation Measure #8).

TRANSPORTATION: Abandonment

Impact: Upon abandonment, geothermal roads may continue to provide access to the project area, but will be prone to the impact of erosion.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; California Regional Water Quality Control Board; Caltrans).

Facts Supporting the Finding:

Trip generation during the abandonment phase involves dismantling and removal of certain equipment and well abandonment. Heavy equipment may also be needed for minor contour grading. It is expected that trip generation would be on the low side of the exploratory drill phase traffic, or about 30 trips per day over a 3 month abandonment procedure. This short-term impact is not significant.

Upon abandonment, access roads may be either restored or left intact for use by landowners. To prevent significant impact from erosion of unsurfaced roads, the following measure is adopted:

- If approved by appropriate agencies, level areas and roads created by geothermal development may be retained for other beneficial uses, provided that effective erosion control measures have been implemented (FEIR Mitigation Measure #12).

TRANSPORTATION: Exploratory Drilling, Field Development, and Abandonment

Impact: Development of the proposed leaseholds, coupled with continuing regional development, will incrementally increase roadway deterioration as a result of the transport of heavy trucks and equipment, will require more frequent repairs, and will be result in increased maintenance costs.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have

been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

The cost of previous roadway improvements or widening often has been allocated to the geothermal developers as a condition of approval for a project. It has also been the responsibility of the developers to resurface and maintain roadways from the well sites and facilities within the leasehold to the proximate highways.

Significant traffic increases are not anticipated to occur along the principal state highways in the region, although slow-moving trucks may constitute a traffic hazard. Specifically, geothermal activity in Project Areas No. 1 and 2 will create a potential nuisance and driving hazard on Cloverdale-Geyser Road. Slow moving trucks climbing steep grades, the narrow road, and inadequate sight distance for passing are contributing factors. Due to the developed nature of geothermal access roads in the vicinity of Cobb Mountain, no significant safety impacts are predicted for access to Project Area No. 3.

The following mitigation measures to fund needed roadway repairs and improve operating safety have been adopted to reduce the adverse transportation impacts to insignificant levels:

- Project-related impacts to the roadbed of local county roadways shall be mitigated through specific agreements between the developer/operator and the county. In some instances, joint funding among several geothermal operators for the initial cost of roadway repair and continued maintenance has been required for roadways utilized by more than one operator (FEIR Mitigation Measure #9).

- Other mitigation measures that may be required of the project include the preparation of a traffic safety plan by the applicant which addresses sign requirements and the coordination of heavy truck traffic, and off-site parking arrangement such as Park n' Ride (FEIR Mitigation Measure #10).

- The counties shall discourage the use of private access roads to steam fields by the general public (FEIR Mitigation Measure #11).

AIR QUALITY: Non-Drilling Exploration

Impact: Non-Drilling exploration will generate air emissions from incidental use of diesel powered equipment and vehicles as well as associated dust generation.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts; State Lands Commission).

Facts Supporting the Finding:

The incidental and sporadic activities during Non-drilling exploration generally will not create significant air emissions, although all such activities are subject to compliance with local Air Pollution Control District regulations as follows:

- Compliance with local APCD rules and regulations relative to equipment operation and dust control will ensure that Non-Drilling Exploration impacts remain insignificant. This includes consideration for asbestos hazard from disturbance of serpentine soils as defined in Measure 3a below (FEIR Mitigation Measure #1).

AIR QUALITY: Exploratory Drilling and Field Development - Drilling Activity

Impact: Potentially significant air pollutants will result from the diesel powered drilling equipment and from truck and passenger vehicles commuting to the drill site.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

Typical drilling diesel prime mover fuel consumption is estimated at about 1,890 li (500 gal) per day. This consumption is based on an assumed 400-horsepower diesel engine operating with a specific fuel consumption of approximately 0.05 gal/hp/hr (EPA 1990). For industrial diesel drives, each liter (0.26 gal) of fuel burned produces about 0.45 kg (1 lb) of oxides of nitrogen, 0.006 kg (0.014 lb) of carbon monoxide, and minor amounts of particulates, unburned hydrocarbons, and sulfur oxides. Since baseline levels of these pollutants are very low, the addition of the diesel emissions will not exacerbate air standards beyond a few feet from the exhaust stacks. Vehicular emissions, involving only a few vehicles dispersed through the area, similarly do not pose any threat to healthful levels of air quality.

Though exploratory well drilling and transportation activities generally will not create significant air emissions, such activities are subject to compliance with local Air Pollution Control District regulations as follows:

- o Compliance with local APCD rules and regulations relative to equipment operation and dust control will ensure that Non-Drilling Exploration impacts remain insignificant. This includes consideration for asbestos hazard from disturbance of serpentine soils as defined in Measure 3a below (FEIR Mitigation Measure #1).

AIR QUALITY: Exploratory Drilling and Field Development - Site Preparation

Impact: Activities to prepare a drill site, excavate the sump, move equipment into position, and travel on unpaved roads produce potentially significant levels fugitive dust.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

Much of the fugitive dust generated during site preparation settles out on nearby foliage, but the smallest particles remain suspended in the air and are dispersed regionally. The EPA suggests a universal dust emission factor of 1,090 kg/acre/month (1.2 tons/acre/month) of activity (EPA-AP 42) which can be reduced by about 50 percent through regular watering. Similarly, each kilometer of unpaved road travel by one vehicle at 30 mph adds about 28 gm of dust to the air. The regional particulate load levels in the air basin will not be significantly affected by these fugitive dust emissions. Locally, dust settling out on nearby surfaces may retard plant growth along the shoulder of dirt access roads and dust plumes along the ridgeline may create objectionable visible dust plumes during the dry summer months. Such impacts are transitory and localized, but can be mitigated by watering down the drill site and by maintaining and enforcing reasonable speeds on dirt access roads, as follows:

- o Fugitive dust generation during drilling activities should be minimized by enforcing reasonable driving speeds on dirt roads, by using water or oil spray to control dusty areas, and by performing major grading activities in spring when natural soil moisture is high (FEIR Mitigation Measure #3).

- o If serpentine soils are detected in pre-construction soil surveys, such areas shall be avoided to the maximum extent possible. If avoidance is not possible, testing shall be conducted to determine whether concentrations of asbestos exceed 1 percent. If so, construction workers and superintendents shall use OSHA-approved respiratory equipment and receive OSHA-approved training in methods to reduce their exposure and downwind receptors. Other measures consistent with APCD regulations shall be implemented (FEIR Mitigation Measure #3a).

AIR QUALITY: Exploratory Drilling and Field Development - Well Drilling, Testing and Cleanout

Impact: Geothermal exploration and development activities may result in the venting of steam containing potentially hazardous gases such as H_2S which could reach significant concentrations downwind under adverse meteorological conditions.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

During testing, a well may produce about 68,000 kg (150,000 lb) of steam per hour, assuming a vapor-dominated resource. Using The Geysers average of 222 ppm of non-condensible H_2S in the steam, about 15 kg (33 lb) of H_2S could be released each hour during a full flow test.

During drilling, a supplementary abatement system can reduce escaping H_2S levels to protect the drilling crew and any nearby receptor. However, during venting and clean-out, the total H_2S burden will be released to the atmosphere. The initial momentum and buoyancy of the plume precludes any localized H_2S impacts, but the downwind transport of this plume could create significant H_2S impacts under adverse meteorological conditions.

Without on-site data, it is difficult to define "adverse meteorological conditions." However, initial calculations show that for a plume rise of 30 m (100 ft), the maximum impact occurs within 1 km under neutral or slightly stable conditions. Maximum concentrations beyond 2 km (1.25 mi) occur at night ("F" Stability) with violations of the California H_2S standard predicted to occur at receptor sites beyond 3 km (1.8 mi) from the source. As the plume rise increases to 50 and 100 m (80 and 300 ft), the ground level concentration drops to below the standard with maxima still occurring in the morning and evening hours near the site, and highest concentrations still occurring at night although at greater distances. ~~Even with 100 m (300 ft)~~

plume rise, ground-level concentrations of 6 to 8 $\mu g/m^3$ (15 to 20 percent of the standard) could still cause the standard to be exceeded if background levels are high enough.

The following measures specifying the timing of venting and requiring BACT have been adopted to reduce adverse H_2S emissions to the extent possible:

- In order to minimize population exposure to high H_2S and other gaseous pollutant levels, venting occurring during the day with light winds will allow the stream plume to disperse well above the surface. Venting at night could impact populated areas adversely and should be limited by conditions placed on air pollution permits during the permitting process. By adjusting operational procedures to fit atmospheric dispersion conditions, the drilling process can be carried out without objectionable H_2S impacts. In instances where it is impractical or impossible to schedule emissions releases to coincide with good meteorological conditions, available portable abatement equipment can be utilized to reduce emissions to acceptable levels. Automated controls should be readily available to anticipate well connection and operation as soon as possible upon well completion (FEIR Mitigation Measure #2).

- The Best Available Control Technologies (BACT) or other state of the art technology (i.e., Stretford process or Hydrogen Peroxide process) shall be implemented to ensure H_2S emissions are below Air Pollution Control District limits (FEIR Mitigation Measure #5).

- Control of particulate emission during drilling should be performed by use of a properly sized wet cyclone using at least 60 gpm water injection. If a resource high in arsenic or other toxic material is encountered, mitigation of significant emissions should be accomplished by available remedies to be selected by the applicant and approved by the applicable air pollution control district (FEIR Mitigation Measure #6).

AIR QUALITY: Exploratory Drilling and Field Development - Well Bleeds

Impact: The impact from well bleeding, particularly if there are several such sources in the same area bleeding simultaneously, could cause H_2S to be carried to downwind receptor areas in sufficient quantity as to constitute a significant air quality impact.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

After testing is completed, wells may be placed on stand-by mode with a slow bleed to maintain a stable well bore temperature and prevent accumulation of condensate, precipitate, or loose well bore material. Otherwise, the wells may be plugged with redrilling occurring consistent with the actual production sequence. Most wells need only a small steam flow rate, but some "wet" wells require a considerable bleed rate to prevent loss of the well. Flow rates range from several hundred pounds of steam per hour to as much as 10 percent of full flow.

In addition to implementing H_2S abatement measures as described above, the impact is further mitigated by the installation of well throttling systems as follows:

o Remote throttling systems should be installed on the wells. In the interim before they are installed, lessee should agree to a throttling schedule to achieve given emissions reduction percentages during stacking situations using on-site personnel to manually turn the valves (FEIR Mitigation Measure #4).

AIR QUALITY: Exploratory Drilling and Field Development - Well Blowouts

Impact: Significant adverse air emission impact would occur from H_2S emitted during a well blowout.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

Operational disruptions could result in a casing failure near the surface unless adherence to mandatory regulations is strictly enforced. If steam had been encountered, it may escape without any controls. Deeper blowouts pose similar hazards, but are usually protected with mandatory blowout prevention equipment. One of the largest H_2S sources in The Geysers would be a single uncontrolled well, and there is a remote possibility of a recurrent event. Such an event could cause a serious impact because decreased plume buoyancy would allow high H_2S concentrations to be injected into low-level inversions, with potential nocturnal drainage flow toward populated receptor sites.

Measures to guard against blowouts have been adopted in relation to system safety impacts (see Systems Safety: Exploratory Drilling, FEIR Mitigation Measures #3 and #4). However, should

there be a blowout or other uncontrolled situation, H_2S emissions could significantly affect populated areas based on area meteorology and known air flow mechanics. While the occurrence of such an accident is very unlikely, the resulting impact is not mitigable.

The EIR evaluated several alternatives which could have the potential to reduce or eliminate the identified environmental impacts.

No Project Alternative

Implementation of the No Project Alternative would mean that the State Lands Commission would not offer any of the lands within the study area for leasing for geothermal resources. These resources would remain undeveloped for the foreseeable future. From the standpoint of the unavoidable adverse impact of a well blowout with unabated hydrogen sulfide emissions, adoption of this alternative would eliminate the impacts from project areas.

It is noted however, that the No Project Alternative would deny the State of California revenues from the leasing program. Also since the steam resource of The Geysers area is diminishing, the resources on the site may diminish over time so that development may not be cost feasible in the future. The energy lost by the No Project Alternative would need to be made up from some other source, most probably fossil fuels. In addition, the probability of a blowout, with current BOPE installed is remote.

Leasing Portions of the Project Areas

This alternative involves leasing one or two of the three project areas identified for prospective leasing. The reasons for omitting any particular leasing area could be numerous; however, this analysis assumes that the reason would be to avoid a potential blowout. Emissions of hazardous substances has a potential for occurrence with aspects of geothermal activity involving exploratory drilling, and field development and operations where ever they occur. Since this alternative does eliminate such activity, the unavoidable adverse impacts could still occur.

Prohibiting Construction of Power Plants

This alternative would allow construction of steam fields in the area, but not development of new power plants. Potential for a well blowout, though remote, would remain a possibility in the area under this alternative.

Alternative Land Uses

This alternative is based on the assumption that the State Lands Commission could encourage alternative land uses, other than geothermal uses, to be established on the leasehold areas. The State Lands Commission is limited in its ability to establish or encourage land uses beyond its jurisdiction to lease lands for resource and mineral development. Local land use approvals for any use subsequent to leasing are under the purview of the local county governments with jurisdiction. The state does own the lands on Cobb Mountain within the designated lease area and would have some land use authority there. Uses other than geothermal development would

not involve hazards from potential well blowout. The adoption of this alternative could eliminate the impact, however, the State Lands Commission has limited ability to implement such an alternative.

Alternative Technology

This alternative assumes that alternative technologies could be implemented to exploit the geothermal resources of the project areas. The need for implementation of alternative technologies has several purposes, including the reduction in the physical environmental impacts of more traditional geothermal development, and the extension of the life of The Geysers steam field through conservation and more efficient use of the resources. However, this alternative does not eliminate the need for drilling and extraction of geothermal resources nor the associated, though remote, potential for a well blowout.

In conclusion, only the No Project and Alternative Land Use Alternatives have been shown to reduce the unavoidable impact of an accident involving geothermal well blowout. Neither of these alternatives allow the State Lands Commission to fulfill its obligations under the Geothermal Resources Act and are not considered feasible, not withstanding efforts by State Lands Commission to minimize to the extent practicable, the significant adverse impacts associated with well blowouts and hydrogen sulfide emissions.

AIR QUALITY: Operation and Maintenance - Well Drilling

Impact: During operation and maintenance phases, it is often necessary to maintain, redrill, and drill new make-up wells which would have similar air emissions impacts as the exploratory phase well drilling activity.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

During operation and maintenance phases, it is often necessary to maintain, redrill, and drill new make-up wells. Emissions from these sources would be similar to the emissions discussed above for the exploratory phase and are adopted as follows:

- All measures listed for Exploratory Drilling and Field Development are applicable to the Operation and Maintenance phase (FEIR Mitigation Measure #7).

AIR QUALITY: Operation and Maintenance - Power Plants

Impact: The increase in H_2S emissions which may be caused by steam stacking at an unabated plant, and/or release of the combined steam flow from a number of wells at a plant could have significant adverse impact on air quality.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts; California Energy Commission).

Facts Supporting the Finding:

Location of the plant site relative to prevailing air flows and stability structure is a dominant effect on H_2S dispersion patterns. Plumes from ridgelines may experience occasional suppressed rise from strong winds with corresponding elevated downwind H_2S concentrations. However, if the elevated buoyant plumes are released near the base of a valley inversion, they will tend to penetrate the inversion with a resultant reduced ground level H_2S impact. Plumes released at lower elevations will often have difficulty in penetrating the inversion. Under these conditions, downwind transport of the plume could create high H_2S concentrations under adverse release conditions.

The combination of abatement equipment, higher natural plume rise from many single wells combined into one large source, and the ability to throttle and possibly divert the steam flow, all reduce the ambient air quality impact from the power plant over the uncontrolled emissions of the well at the wellhead. However, because the flowfield is more complex and the combination of abatement, throttling, intertie, plume rise, etc. at the power plant are more difficult to estimate, it is more difficult to predict the impact from a power plant than from a single, isolated well.

Mitigation of H_2S impacts from power plants to receptors is accomplished by implementing the following abatement and location measures:

- Any new facility must undergo an analysis to determine if it threatens, delays, or prevents the attainment the 30 ppb hourly H_2S standard. It must not contribute H_2S concentrations to the ambient environment such that the sum of this project plus the background concentration exceed the hourly standard (FEIR Mitigation Measure #8).

- An $NaOH/H_2O_2$ abatement system should be installed and ready for operation prior to initiating drilling with compressed air. Injection should start when significant

concentrations of H_2S are encountered. Blowout control equipment shall be installed after installation of casing and materials should be available within the immediate Geysers area for timely emergency response (FEIR Mitigation Measure #9).

- o Project objectives should be to identify optimal power plant location and develop operational plans to avoid severe air quality impact events (FEIR Mitigation Measure #10).

- o Continuous monitoring of radon-222 in off gas noncondensible treatment stream shall be instituted to ensure that the level of emissions remains low (FEIR Mitigation Measure #12).

AIR QUALITY: Operation and Maintenance - Abatement Technologies

Impact: Hydrogen sulfide emissions and their abatement relating to well development and maintenance and steam transmission remains problematical and a potentially significant adverse impact of geothermal development.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts; California Energy Commission).

Facts Supporting the Finding:

The introduction of abatement equipment in condenser/cooling tower systems has greatly reduced emissions and, correspondingly, the ambient hydrogen sulfide concentrations. Theses systems include the Stretford Process, the Vent Gas Incineration System, and the noncommercial EIC process.

Newer plants should be less likely to engage in untreated stacking due to the adaption of turbine bypass design of the plants. Simply put, this system reroutes steam to the condenser (and associated abatement equipment) if mechanical problems develop or simply through the abatement equipment alone, until steam flow can be reduced or power generation resumes. With these techniques in use, new power plant emissions of H_2S have been reduced to benign levels.

Abatement of emissions from well development and maintenance and from steam transmission is still problematical. Given current stacking control technology, effective treatment of the and the cost of effective abatement is high. It appears that significant technological advances are needed if these intermittent, distributed sources are to be effectively controlled.

Because of these uncertainties, continued research and legislative mandate are encouraged to spark the necessary technological innovation to effectively abate hydrogen sulfide constituents in geothermal steam as follows:

- Requirements to make geothermal steam field-power plant technological improvements in operational management and in pollutant abatement systems should be encouraged and legislated. Promising systems should be tested and used to retrofit older plants so that standards of H_2S emissions can be realized (FEIR Mitigation Measure #11).

AIR QUALITY: Operation and Maintenance - Abatement Technologies

Impact: Site abandonment may create significant adverse impacts due to site grading, demolition, or capping of wells.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts; California Division of Oil and Gas;).

Facts Supporting the Finding:

Abandonment activities include minor site grading, revegetation, facilities demolition or dismantling and shutting in or down of active wells. Impacts are similar to construction activities and are potentially significant. Measures to mitigate such impacts, including preparation of a plan of abandonment, and control of fugitive dust will be implemented as follows:

- A plan of abandonment shall be prepared prior to removal of any equipment from geothermal sites. The plan shall include a residuals and hazardous materials survey and sampling program to ascertain quantity and quality of potential residual and hazardous materials. Based on the survey, the proper procedures for demolition and disposal shall be developed, incorporating BACT, and submitted to the appropriate County agency for approval (FEIR Mitigation Measure #13).

- Steam emissions from idle wells should be minimized through the use of gas caps, temporary plugs, and timely abandonment procedures (FEIR Mitigation Measure #14).

- Fugitive dust generation from site demolition and material removal should be minimized by enforcing reasonable driving speeds on dirt roads and through use of water spray. Precautions relative to serpentine soils shall be implemented as discussed in Measure 3a above (FEIR Mitigation Measure #15).

AIR QUALITY: Cumulative Impacts

Impact: Cumulative air quality impacts from additional geothermal development will result in increased emissions from various vehicular and geothermal sources, including emissions of hydrogen sulfide and other potentially harmful and toxic elements such as ammonia, arsenic, boron, mercury, radon-222, silicon, sulfur dioxide and sulfates.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties; Local Air Pollution Control Districts).

Facts Supporting the Finding:

According to Lake County (1989), existing operations in The Geysers area generate a potential for 307 kg (6,770 lb) per hour of uncontrolled H_2S emissions, although application of control technology reduces the emissions to approximately 172 kg (380 pounds) per hour. By proportion, cumulative projects would increase the H_2S generation rate to approximately 3,785 kg (8,344 lb) per hour uncontrolled, or 212 kg (468 pounds) per hour controlled. Depending upon location of cumulative projects and micrometeorological effects, it is possible that H_2S levels could exceed the hourly standard in some populated areas of Lake County (such as Anderson Springs and Cobb Valley).

As mentioned in Section 4.9.3, the major sources of emissions include blowouts (uncontrolled well venting), bleeding (when wells are on stand-by) and stacking (incurred when a facility is "throttled back" and steam is vented directly to the atmosphere). Though these may not constitute serious emissions sources in of themselves, the cumulative impact from all existing facilities in addition to those which could conceivably be built is considered significant.

The measures to mitigate cumulative impacts from H_2S emissions are the same as listed for site-specific impacts, that is FEIR Mitigation Measure #2, #4, #5, #8, #9, #10, and #11. Thought the probability of a blowout or an uncontrolled well is extremely low the resulting potentially high hydrogen sulfide emissions are not mitigable.

The EIR evaluated several alternatives which could have the potential to reduce or eliminate the identified environmental impacts. The conclusions with respect to feasibility of alternatives is the same for cumulative impacts as was discussed for the site-specific impacts.

Of the alternatives considered, only the No Project and Alternative Land Use Alternatives have been shown to reduce the unavoidable impact of an accident involving geothermal well blowout. Neither of these alternatives allow the State Lands Commission to fulfill its obligations under the Geothermal Resources Act and are not considered feasible, not withstanding efforts by State Lands Commission to minimize to the extent practicable, the significant adverse impacts associated with well blowouts and hydrogen sulfide emissions.

ACOUSTICAL ENVIRONMENT: Non-Drilling Exploration Activities

Impact: Seismic surveys may subject nearby sensitive receptors to significant noise levels.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

Facts Supporting the Finding:

Typically, before the geothermal wells are located, various types of surveys will be conducted. These may include resistivity, seismic, gravity, and magnetometer surveys as well as others. Of these surveys, the only one which is noisy by nature is the seismic survey. This survey requires the use of a machine which either vibrates or pounds the ground. Assuming that the seismic survey "ground shaker" emits a noise level similar to a vibratory compactor, then the peak anticipated noise level is 82 dBA as measured at 15 m (50 ft). Based upon an atmospheric sound attenuation rate of 6 dBA per doubling of distance, a minimum distance of 366 m (1,200 ft) would have to be maintained between the machinery and the nearest sensitive receptor to reduce impacts to insignificant levels as provided below:

o Seismic surveys shall not be located closer than 366 m (1,200) ft from existing residences or other sensitive receptors (FEIR Mitigation Measure #1).

ACOUSTICAL ENVIRONMENT: Exploratory Drilling

Impact: Exploratory drilling activities may subject nearby sensitive receptors and on-site workers to significant noise levels.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

Construction of access roads and well pads will require the use of heavy equipment such as bulldozers, scrapers, backhoes, water trucks, etc., which will generate noise levels of approximately 80 to 85 dBA at a distance of 50 feet. Additional noise will be generated by trucks delivering well supplies and during the well drilling operations. In addition to the adverse noise affects which would be imposed on any nearby sensitive of-site receptors, on-site workers could be subjected to significant adverse noise impacts.

The following mitigation measures requiring compliance with proposed noise standards and limitations on activities will be implemented to reduce these potentially significant acoustical impacts to below significant levels:

- The applicant shall meet a noise standard Ldn 50 dBA with a 10 dBA penalty between the hours of 10:00 P.M. and 7:00 A.M. of the following day at the nearest receptor. Noise levels from drilling operations will be muffled and times of operation limited so as not to constitute a public nuisance (FEIR Mitigation Measure #2).

- The hours of heavy truck traffic to and from the site will be restricted to between the hours of 7:00 A.M. and 7:00 P.M. only, except in cases of blowout, emergency pumping of the sump or threat of personal injury. Where necessary, traffic shall be rerouted away from noise sensitive areas to alleviate noise problems (FEIR Mitigation Measure #3).

- Drill pipes shall not be laid in bins between the hours of 8:00 P.M. and 7:00 A.M. the following day (FEIR Mitigation Measure #4).

- Developments in noise-sensitive locations shall not produce noise levels more than 10 dB greater than the 24 hour average pre-development ambient Leq for periods of greater than one hour in any 24-hour period (FEIR Mitigation Measure #5).

- Unless specifically waived by the applicable County Planning Commission, where legally permissible, the following minimum distances shall be observed in placing a well:

Outer Boundary of Parcel (Leasehold Agreement)	30 m (100 ft)
Public Roads	30 m (100 ft)
Residence	300 m (1,000 ft)
School	805 m (2,640 ft)
Hospital	1,610 m (5,280 ft)
Any other development	152 m (500 ft)

(FEIR Mitigation Measure #6)

- o Drilling, clean-out, and well testing and producing operations must be muffled at all times except in times of extreme emergency. There will be no changing of valves except on Monday through Saturday between the hours of 8:00 A.M. and 6:00 P.M. (FEIR Mitigation Measure #7).

- o No geothermal well shall be drilled within 0.8 km (0.5 mi) of any populated area (defined as more than 10 dwelling units established within 0.4 km [.25 mi] diameter area) or within 0.8 km (0.5 mi) of any recorded subdivision without consent of at least 75 percent of the owners having been obtained (FEIR Mitigation Measure #8).
- o Additionally, noise control practices require that all engines be fitted with mufflers as supplied by the manufacturer. Finally, the county advocates the use of the best available control technology for construction noise controls which might entail the use of berms, barriers, orienting equipment such that exhaust stacks point away from sensitive receptors and noisy equipment is physically shielded by quieter pieces, additional time-of-day restrictions, etc. (FEIR Mitigation Measure #9).

- o In accordance with OSHA regulations, all workers who are subject to noise in exceedance of the allowable levels will be provided with adequate hearing protection (FEIR Mitigation Measure #10).

- o Air drilling exhausts, well clean-out, and production tests should be directed through a cyclonic muffler/separator with water injection when feasible to give an attenuation to 90 dBA or less at 15 m (50 ft) (FEIR Mitigation Measure #11).

- o Major noise sources during drilling, such as engines, pumps and compressors, can be placed on the side of the pad away form the nearest receptor. Cyclonic muffler/separator and test mufflers shall be located on the side of the pad away from receptor locations, and stream flow directed away from them as well (FEIR Mitigation Measure #12).

- o Production tests shall be conducted into existing steam pipelines when possible (FEIR Mitigation Measure #13).

- o Noisy steam-handling equipment, steam piping, and steam ejector housing shall be insulated with materials possessing good acoustic and thermal properties (FEIR Mitigation Measure #14).

ACOUSTICAL ENVIRONMENT: Full Field Development

Impact: Power plant and production pipeline construction will produce significant daytime noise impacts.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

Noise sources throughout all phases of plant construction include large diesel powered equipment, but the specific equipment varies with the phase and the contractor performing the work. Typical equipment includes; bulldozers, scrapers, cranes, cement mixers, tractor trailer rigs, backhoes, power generators, and cranes. Other spurious noises such as impact tools and steel handling will also take place. Additionally, the noise from the installation of the pipelines which carry steam from the well heads to the plant will generate noise, but as the amount of heavy equipment necessary to install the steam lines is limited relative to that involved in plant construction, and the placement and construction of the well pads will be situated to reduce noise impacts on sensitive receptors, no additional impacts are expected from pipeline construction. Considering the equipment requirements for this phase of the project, and assuming the standard atmospheric attenuation of 6 dBA per doubling of the distance, a distance of approximately 1,311 m (4,300 ft) will be necessary to attenuate the noise of plant construction down to 55 dBA.

The following mitigation measures requiring consideration of distance to receptors and noise monitoring will be implemented in order to reduce potentially noise impacts to insignificant levels:

- Measures listed for Exploratory Drilling are applicable to the Field Development Phase (FEIR Mitigation Measure #15).

- Mitigation measures for noise impacts involve the placement of wells, power plants, etc. at distances where the produced noise will be atmospherically attenuated to the regulatory noise levels at the nearby sensitive receptors. As the exact placement of equipment as well as the locations of nearby sensitive receptors is currently unknown, they will have to be evaluated on a case-by-case basis when deciding upon construction locations (FEIR Mitigation Measure #16).

- The counties should consider requiring the installation of permanent noise monitors at sensitive noise receptors near residential development (FEIR Mitigation Measure #17).

ACOUSTICAL ENVIRONMENT: **Operation and Maintenance**

Impact: Plant operations are expected to generate noise levels ranging up to 77 dBA at a distance of 50 feet from the source. Additional potentially significant adverse noise impacts may be generated by construction workers and employees commuting to work.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

Plant operations are expected to generate a noise level of approximately 76 to 77 dBA at 17 m (50 ft). As plants will be in fairly continuous operation, they will be governed by the 50 dBA Ldn noise limit. To stay within this limit, the facility must not exceed a constant noise level of approximately 43 dBA Leq. Based upon the standard atmospheric attenuation of 6 dBA per doubling of distance, and a produced noise level of 77 dBA, approximately 823 m (2,700 ft) will be required to attenuate the plant noise down to this level of 43 dBA.
In addition to noise created as a direct result of plant and field operations, employees commuting to work have the potential to create noise impacts as a result of vehicle noise emissions. Because there is a reasonable potential to develop approximately 450 MW of additional geothermal energy from both Lake and Sonoma Counties, a worst case scenario could involve the construction of two plants simultaneously with six facilities already on-line. Project implementation assuming this scenario would raise future noise levels by less than 1 dBA Ldn.

Implementation of the following measures including use of proper mufflers and other operational factors to reduce noise will mitigate noise generation to insignificant levels:

- Measures listed for Field Development are applicable to the Operation and Maintenance phase (FEIR Mitigation Measure #18).

- During steam field production start-up after a power plant outage, every effort shall be made to minimize the length of time required for full venting of wells closest to receptors (FEIR Mitigation Measure #19).

- During plant shutdown, steam will be routed through the turbine bypass system to the condenser. A muffling system will be used if atmospheric discharge is needed (FEIR Mitigation Measure #20).

- Where appropriate, rock mufflers or other similar sound attenuation devices shall be installed to muffle venting operations. Baffles or other containment devices should be used to reduce cooling tower drift (FEIR Mitigation Measure #21).

- Control valve noise shall be minimized by limiting bulb pressure drop, enclosing the valves, muffling the downstream pipe, and lagging pipes adjacent to a valve. In some cases, it may be necessary to fill the pipe stands with concrete (FEIR Mitigation Measure #22).

ACOUSTICAL ENVIRONMENT: Cumulative Impacts

Impact: The cumulative effect of development in the region would be an increase in ambient-noise levels.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma and Mendocino Counties).

Facts Supporting the Finding:

The magnitude of ambient-noise level increase is dependent upon site-specific conditions; however, such noise levels would be substantially above that of similar, non-industrial areas in the region. While noise sensitive receptors are few in the region, new developments could be located in the vicinity of rural inhabited areas. Noise generation and propagation, therefore, is a potentially significant cumulative effect.

The monitoring, regulatory and operational measures for the various phases of the project listed above will reduce cumulative impacts to insignificant levels.

SOCIOECONOMICS AND PUBLIC SERVICES: Fire and Police Protection, and Medical Services

Impact: Increased human activity in the project areas during the Non-Drilling Exploration phase of the project would result in a potential increased demand for police and fire protection, and emergency services.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; California Department of Forestry).

Facts Supporting the Finding:

A potential need for emergency services from police and fire protection agencies may be generated by the increased human activity and operation of vehicles in all three proposed project areas. Brush fires may be started by sparks from off-road vehicles, through negligence of field personnel, and campfires. As the project area is classified as an extreme fire hazard area, wildfires have the potential of rapidly spreading and doing damage to the watershed and cause property and structure losses in adjacent populated areas. The local and state fire services are equipped to handle fire outbreaks throughout the project area although response times are limited by the remoteness of the area.

Exploration activities will also result in an greater number of vehicles on the roads and an increased potential for accidents to occur. Increased demands for traffic enforcement services and accident investigations could result; however, significant adverse impacts to law enforcement and emergency services are not anticipated.

The following mitigation measures requiring coordination with California Department of Forestry and implementation of vegetation management are proposed for the non-drilling exploration phase of the project in order to reduce adverse impacts on fire, police and other emergency protection to levels insignificance:

- During exploratory and construction activities, all vehicles which will travel off-road shall be equipped with CDF-approved spark arrestors. No vehicle equipped with a catalytic converter shall be stopped over or close to brush, weeds, or other combustible growth (FEIR Mitigation Measure #1).

- Personnel involved in exploratory or construction activities shall be prohibited from smoking at all times in any wildland or forest areas. In addition, personnel shall be prohibited from building campfires of any sort while in the wildland or forest areas for any purpose (FEIR Mitigation Measure #2).

- The adoption of fire safety guidelines provided by the CDF will be considered in areas subject to high and very high wildland fire hazards (FEIR Mitigation Measure #3).

- Controlled burning programs shall be supported in areas of high fire hazard to reduce the amount of combustible growth. Brush clearing around construction and development areas and geothermal facilities will be coordinated with the CDF. Clearance of highly volatile vegetation is required within 100 ft of structures in fire prone areas (FEIR Mitigation Measure #4).

- Other vegetation management techniques are intended to reduce fuel loading and include maintenance of firebreaks and fuel modification, such as thinning and irrigated buffers (FEIR Mitigation Measure #5).

- A checklist of manpower and fire-fighting equipment, including water sources shall be available in the event of a fire (FEIR Mitigation Measure #6).

SOCIOECONOMICS AND PUBLIC SERVICES: Fire and Police Protection, and Medical Services

Impact: During the Exploratory Drilling, Development, and Operation and Maintenance phases of the project increased human activity in the project areas would result in a potential increased demand for police and fire protection, and emergency services.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; California Department of Forestry; California Highway Patrol).

Facts Supporting the Finding:

The increased amount of activity due to exploratory drilling and development of the leaseholds will result in an additional demand for law and traffic enforcement services. The increased number of vehicles and heavy equipment on the roads, the provision of additional roads to patrol, and potential increase in traffic accidents may require additional personnel and patrol cars to serve the project area and respond to emergencies. Also, development activities will increase the amount of hazardous and toxic material transported, and the potential for spills to occur.

Activities from drilling and lease development include the use of drilling equipment, the construction of pads, grading, and the provision of roadways. When drilling, there is the possibility of a blowout, release of and exposure to toxic gasses and steam. As with exploration activities, brush fires from drilling and construction activities, sparks from vehicles, and carelessness can occur resulting in a potentially significant adverse impact to fire protection services.

The following mitigation measures requiring areawide coordination, emergency notification, and facilities design features are proposed for the Exploratory Drilling, Development, and Operation and Maintenance phases of the project to reduce adverse impacts on fire, police and other emergency protection to levels insignificance:

- Non-Drilling Exploration fire, police protection, and medical services mitigation measures shall apply to the Exploratory Drilling, Development, and Operation and Maintenance phases of the project (FEIR Mitigation Measure #9).

- Developers of geothermal resources shall consider the use of private security forces to serve the facilities and plant operations (FEIR Mitigation Measure #8).

- Additional police personnel will be provided as needed by the respective county sheriff's office. CHP will provide patrols and personnel to provide additional traffic enforcement as needed (FEIR Mitigation Measure #26).

- Developers shall be required to participate in an area of benefit agreement for the purpose of developing a unified emergency notification and communication linking the geothermal facilities, the CDF, Lake, Mendocino, and Sonoma County Sheriff's Offices, CHP, and other agencies. This system may be integrated with the Lake County Sheriff Department central dispatch system (FEIR Mitigation Measure #27).

- Any additional personnel or equipment for fire protection will be provided by the state and local fire fighting services as needed. The developers shall pay any applicable fees to the state, county, or local fire protection services (FEIR Mitigation Measure #10).

- New buildings and facilities shall incorporate structural and design features that comply with applicable fire protection ordinances. These features will include use of fire retardant materials in construction, fire retardant plant materials in landscaping around the facilities, smoke alarms, sprinkler systems, fire extinguishers, and adequate posting of emergency exit routes and evacuation procedures (FEIR Mitigation Measure #11).

- Wellfield developers and electrical generators shall consider participation in a joint powers agreement with the respective counties as recommended by the CDF to improve fire protection within The Geysers (FEIR Mitigation Measure #28).

- The adoption of fire safety guidelines provided by the CDF will be considered in areas subject to high and very high wildland fire hazards (FEIR Mitigation Measure #29).

- Comprehensive fire protection plans shall be submitted by developers of the geothermal resources for review by local fire protection districts and the CDF. The fire protection plans shall identify the person/user responsible for ensuring that the fire protection/prevention plans are implemented (FEIR Mitigation Measure #30).
- Emergency response and evacuation plans shall include the provision of looped and double access road systems as escape routes for wildland fire emergencies. Fire access maps shall be provided to the appropriate fire districts. Access roads and bridges to geothermal facilities shall have adequate load capabilities and be wide enough to safely accommodate fully loaded fire safety equipment (FEIR Mitigation Measure #31).

- Controlled burning programs shall be supported in areas of high fire hazard to reduce the amount of combustible growth. Brush clearing around construction and development areas and geothermal facilities will be coordinated with the CDF. Clearance of highly volatile vegetation is required within 100 ft of structures in fire prone areas (FEIR Mitigation Measure #32).

- Other vegetation management techniques are intended to reduce fuel loading and include maintenance of firebreaks and fuel modification, such as thinning and irrigated buffers (FEIR Mitigation Measure #33).

- o Emergency respirator equipment shall be provided throughout geothermal facilities for use in the event of an accidental release of hazardous gas. All personnel shall be trained in the use of respirator equipment and the proper steps to be taken in the event of a gas release (FEIR Mitigation Measure #34).

- o On-site water storage for fire protection shall be provided. Storage can include tanks, ponds, pools, or wells where water is reserved for fire protection (FEIR Mitigation Measure #35).

SOCIOECONOMICS AND PUBLIC SERVICES: Water

Impact: During the Exploratory Drilling, Development, and Operation and Maintenance phases of the project increased water demand from geothermal operations could result in significant adverse impacts to already limited water resources in the area. There is also a potential over-use surface waters.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; Regional Water Quality Control Board; California Department of Water Resources; local water agencies).

Facts Supporting the Finding:

During the exploratory drilling and field development phases, water will be required for the well drilling process and to facilitate dust control during construction of access roads, well pads, and plant facilities. Water required for this phase of development can be purchased from local water district suppliers and hauled to the site. Bottled water would be provided for the domestic uses of drilling and construction crews.

Power plant operations will require water for domestic uses, plant maintenance, landscaping, H_2S abatement, fire protection, and cooling tower make-up. It is anticipated that water requirements for H_2S abatement and cooling tower replacement volumes will be met using condensate from the power generation cycle and therefore, will not require and outside water source except for initial start-up procedures. Additional water demand from geothermal operations can result in adverse impacts to the current water resources. If no adequate volumes of surface or groundwater are present within the leasehold, water demand from geothermal projects in the lease will result in a significant adverse impact.

Another potentially significant adverse impact is the over-use of surface waters, notably from streams, in the operations of the power plants. While condensate waters are used for routine

plant operations, some operators in the area are diverting large volumes of water from surface streams for general operations and for additional injection into the steam wells. Surface water resources are limited and groundwater sources are not well developed. Increases in water demand generated from geothermal operations could significantly impact surface water supplies in the project areas.

Potentially significant adverse water impacts can be reduced to insignificant levels by implementing measures to regulate water supply diversion and facilitate importation of water as follows:

- Assurance for the provision of adequate water and sewer service is required prior to approval and implementation of development. All applicable water and sewer districts and departments will review water and sewer system demands for each phase of development for conformance to district design requirements and for ability to serve (FEIR Mitigation Measure #12).

- Planning for geothermal development in the leaseholds shall be provided with a with a goal of balancing local water resource needs. Utilization of local water resources should not adversely affect other nearby downstream water needs. The state, counties, and users of the leaseholds shall develop appropriate measures to protect area water rights in order to assure that long-term water needs for development and growth can be adequately met (FEIR Mitigation Measure #13).

- Water demand in areas with insufficient water resources can be partially mitigated by importing water from local suppliers (FEIR Mitigation Measure #14).

- Developers shall design and submit water and sewer plans for each proposed development project in the geothermal project areas for review and approval by the appropriate Water and Sanitation Districts of the respective counties (FEIR Mitigation Measure #15).

- The capital cost of new water distribution and sewage collection systems, pump stations, septic systems, and reservoirs to handle on-site flows will be borne by the applicant and dedicated to the appropriate Water and Sanitation District of the respective counties (FEIR Mitigation Measure #16).

- Permits for the withdrawal and diversion of water from surface streams, subterranean channels, and other bodies of water for geothermal-related uses will be obtained from the State Water Resources Control Board (SWRCB). Permit conditions include terms which require certain minimum flows during water removal as a means of protecting aquatic resources (FEIR Mitigation Measure #17).

SOCIOECONOMICS AND PUBLIC SERVICES: Wastewater

Impact: During the Exploratory Drilling, Development, and Operation and Maintenance phases of the project there will be a nominal, adverse impact associated with increased wastewater generation. The use of septic systems in the project areas will result in potential adverse impacts to water quality.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; Regional Water Quality Control Board; California Department of Water Resources; local water agencies).

Facts Supporting the Finding:

Incremental impacts to domestic wastewater systems and septic systems are expected from increases in population associated with the increased workforce. The additional wastewater generated by the development and operation of geothermal facilities in the proposed leaseholds is considered an adverse impact. However, current wastewater disposal practices including collection and treatment systems and on-site systems will be sufficient to handle the additional wastewater. Exploratory drilling projects and construction sites will be provided with portable chemical toilets. Sanitary wastes are removed from the site when temporary activities are completed and disposed of at county-permitted sanitation facilities.

Sewage produced at geothermal power plants will be handled by on-site septic systems. The use of septic systems in the project areas will result in potential adverse impacts to water quality. In addition, accidental spills from condensate reinjection and sump failures may occur during operation phases.

Potentially significant adverse impacts associated with increased wastewater generation and disposal will be mitigated to insignificant levels by implementing measures to control discharges to sumps and provide package wastewater treatment systems as follows:

- The provision of a package wastewater treatment plant to accommodate large development and growth will be considered in areas where the use of septic tanks is not feasible (FEIR Mitigation Measure #39).

- Assurance for the provision of adequate water and sewer service shall be required before development is allowed to proceed (FEIR Mitigation Measure #12).

- Sanitary and hand washing facilities shall be provided at each drill site as specified by the County Health Departments (FEIR Mitigation Measure #7).

- o Required permits shall be obtained for additional discharge to sewer systems, drainage systems, sumps and injection wells, including Industrial Waste Discharge Permits issued by the Sanitation Districts and NPDES (National Pollution Discharge Elimination Permits) issued by the Regional Water Quality Control Board (FEIR Mitigation Measure #18).

- o Waste sumps and septic systems shall be properly installed and maintained to prevent leakage and spills which could contaminate surface water and groundwater sources (FEIR Mitigation Measure #19).

- o Drilling sumps shall be constructed to meet the waste discharge requirements of the Regional Water Quality Control Board (FEIR Mitigation Measure #20).

- o Contents of waste sumps shall be tested and classified to determine final waste disposal requirements. Nonhazardous solid wastes can be dried, mixed with soil and buried on-site. Hazardous wastes and potentially harmful wastes must be removed and disposed of in an approved Class I or Class II WMU (FEIR Mitigation Measure #42).

SOCIOECONOMICS AND PUBLIC SERVICE: Solid Waste

Impact: Volumes of waste generated during the Exploratory Drilling, Development, and Operation and Maintenance phases of the project be a significant adverse impact. Landfills and hazardous waste management units will be incrementally impacted.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; Regional Water Quality Control Board).

Facts Supporting the Finding:

Currently, no solid waste is being produced from the project areas. Therefore, the volumes of solid waste generated during drilling, field development, and operations will be substantial and will be a significant adverse impact. Drilling, construction, and operations will produce debris and domestic wastes. Hazardous and designated solid waste will also result from a number of processes that are part of the geothermal development technology. The potential sources of solid waste include well drilling mud and cuttings, brine clarification wastes, scale, and sludge and wastes produced from hydrogen sulfide abatement.

Non-hazardous solid waste and municipal waste generated by drilling, development, and operations will be collected and disposed of at the Clearlake Highlands Landfill. The facility currently has sufficient capacity to accept the inert solid wastes expected to be generated by geothermal activities in the proposed leaseholds. However, while the volume of inert solid waste is not expected to be significant, it will incrementally shorten the life of the landfill and therefore, will be an adverse impact.

Potentially significant adverse impacts associated with increased solid waste generation and disposal will be mitigated to insignificant levels by implementing solid waste management plans and facility permitting review as follows:

- o County Solid Waste Management Plans include programs to reduce the quantities of nonhazardous solid waste being sent to landfills. These programs include source reduction, separation of recoverables, composting, and high technology resource recovery. The applicant shall implement these programs to reduce the increase in solid waste generation associated with development in the leaseholds, and will thereby extend the life of the affected disposal sites (FEIR Mitigation Measure #21).

- o Drilling sumps which are intended to be used longer than one year will require a Solid Waste Facility Permit from the Solid Waste Management Board. The Solid Waste Facilities Permit is issued by the State and requires that the sumps be designated by appropriate zoning and consistent with the General Plan (FEIR Mitigation Measure #44).

SOCIOECONOMICS AND PUBLIC SERVICES: **Energy Utilities**

Impact: A substantial amount of energy will be expended during the exploration, development, and operational phases of the project, resulting in a short-term adverse impacts.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; California Energy Commission).

Facts Supporting the Finding:

Additional power lines to serve development and operation activities in the project areas will be installed by PG&E. Bottled propane gas and fuel oil will be supplied by local distributors. It is anticipated that exploration, development, and operation activities will expend substantial

amounts of electricity, gas, and fuel. Increased demand for electricity, gas and fuel is not expected to result in a significant impact to the current service levels, however energy consumption itself represents a loss on nonrenewable resources and is thus considered a significant adverse impact.

Potentially significant adverse impacts associated with the project related to energy consumption will be mitigated to insignificant levels by implementing measures requiring conservation and facility efficiency as follows:

- o PG&E can provide assistance in selection of effective energy conservation techniques and infrastructure construction (FEIR Mitigation Measure #22).

- o Development plans shall be made available to all involved utilities as they become available in order to facilitate engineering, design, and construction of improvements (FEIR Mitigation Measure #23).

- o Architectural and mechanical plans for the facilities shall be carefully reviewed to verify that the lowest energy rated mechanical and electrical equipment has been specified (FEIR Mitigation Measure #24).

- o Facilities will be designed for optimum energy efficiency in accordance with Energy Conservation Standards for non-residential buildings. The use of solar energy and waste heat recovery systems shall be incorporated into the design of facilities wherever feasible (FEIR Mitigation Measure #25).

SOCIOECONOMICS AND PUBLIC SERVICES: Schools

Impact: The increase in student and the need for additional classroom space will result in significant adverse impacts to local school districts, as a majority of the schools are already operating over capacity.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; local school districts).

Facts Supporting the Finding:

As exploration activities are short-term, no impacts to schools are expected. Estimates of future increases or decreases in enrollment in county schools are difficult to project. The greatest increases in the workforce population will be during the exploration and development phases

within the proposed project areas. However, future development activities are not expected to attract a significant number of new residents to the county, therefore, many of the workers who would be employed by new geothermal projects will likely be permanent residents already living in the area. Nonetheless, any increase in students and the need for additional classroom space will result in a significant adverse impact to school services since the majority of schools are already operating over-capacity.
The current development impact fee established in 1986 by passage of AB 2926 is not expected to provide sufficient mitigation payments from future geothermal projects to the school districts to offset future enrollment levels. Under this legislation, school districts are paid 25 cents per square ft of covered or enclosed industrial, i.e., geothermal space built within their jurisdiction.

Potentially significant adverse project impacts related to overcrowding in local schools will be mitigated to insignificant levels by payment of school impaction fees and through other mitigation agreements between geothermal developers and school districts as follows:

- Developers of the proposed leaseholds shall pay required state impact fees to mitigate school impacts resulting from geothermal-related development. This standard fee will only partially mitigate school impacts (FEIR Mitigation Measure #46).

- Developers shall also consider entering into additional mitigation agreements with the County Office of Education and the school districts to supplement state impact fees. Mitigation can include the provision of additional school sites and temporary school buildings (FEIR Mitigation Measure #47).

- The mitigation agreements/fees shall include provision, if necessary, for school buses. The mitigation fee shall be a one-time fee for students whose families have relocated to the district since the certification of the project (FEIR Mitigation Measure #48).

SOCIOECONOMICS AND PUBLIC SERVICES: **Cumulative Impacts**

Impact: Specific geothermal projects could overtax public services within local subareas.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties; California Department of Forestry; California Highway Patrol; California Department of Water Resources; Regional Water Quality Control Board; California Energy Commission; local water agencies; local school districts).

Facts Supporting the Finding:

Attendant with an increase in population is an increased demand for public services. Though the increase in demand for public services associated with geothermal employment growth is likely to be insignificant, specific subareas in the region are plagued by certain service and capacity problems associated with small water systems, wastewater disposal, and schools. Thus, individual projects must continue to be assessed for their affect on such services.

Potentially significant adverse impacts associated with the cumulative project effect on public services will be mitigated to insignificant levels by implementing the mitigation measures described for individual services (above). On a site-specific basis, additional mitigation measures shall be prescribed as necessary to ensure cumulative project development will not result in significant adverse impacts.

AESTHETICS: Exploratory Drilling

Impact: Potentially significant adverse visual modifications to the landscape may occur.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

Exploratory drilling requires the preparation of a pad and access roadways in addition to equipment delivery and set up of the drilling rig itself. Visual modifications from this activity will include; introduced changes in the form, line, and texture of the area from the pad site and road cutting activity, introduction of a visually obtrusive element (the drill rig and support vehicles), changes in the character of the landscape from undeveloped to partially developed and/or disturbed which will compete with surrounding undeveloped/rural settings, and, changes in viewer expectations depending on where the exploratory drilling is located (whether it is within a sensitive viewshed).

In addition, most drill rigs operate on a 24-hour basis, thus requiring night lighting. Steam venting out during this operation combined with lighting may be visible at night.

The following mitigation measures relating to pad and facilities design and location will be implemented to reduce visual impacts during exploratory drilling to insignificant levels:

- o Pads, roads, pipelines, plants, and transmission facilities shall be designed so as to present the least visual intrusion on views from popular use areas. Consideration shall be given to the facility's distance from potential viewers during the design process (FEIR Mitigation Measure #1).

- o The use of local rock types for road and pad surfacing material will help minimize color contrast between engineered and natural land forms (FEIR Mitigation Measure #2).

AESTHETICS: Full Field Development

Impact: Potentially significant adverse visual modifications to the landscape may occur.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

Lease development will involve the combination of visual impacts similar to those resulting from well drilling with a combination of other visual elements. More activity will be visible during construction than at any other time. Many trucks will be bringing materials into the leasehold area, significantly increasing activity within and through nearby local communities. Also associated with lease development is the construction of power transmission facilities composed of high-voltage lattice-type transmission towers. These will be placed both on-site and off-site to make necessary inter-ties to an existing PG&E system.

Temporary night lighting will be placed on drill rigs and possibly other construction areas. Permanent low-level lighting will be placed on structures and pads which will show as pin points of light from a distance. Illumination may be increased by steam from the well pads as well as the plants at night.

These changes have the potential to result in a significant visual impact which is dependent on viewer sensitivity, proximity and relative scale from the lease development activity. The following mitigation measures relating to facilities design will be implemented to reduce these aesthetic impacts to insignificant levels:

- o Exploratory Drilling mitigation measures shall be applicable to the Operation and Maintenance Field Development phase (FEIR Mitigation Measure #3).

- On visual edges such as ridgelines, construction of facilities shall maintain a low profile design. A low profile design for pipelines shall also be incorporated. All pads, roads, pipelines, and transmission towers, as well as buildings, shall utilize existing vegetation and topography to the maximum extent possible for visual screening. Pipelines and roads shall lie parallel to existing terrain contours to minimize visual breaks in the landscape. In areas of visual sensitivity, visual analysis shall include the use of vertical versus horizontal pipeline expansion loops to minimize visibility (FEIR Mitigation Measure #4).

- Plants, control buildings, maintenance buildings, pump stations, and other structures shall be constructed and colored in natural browns and shades of greens to blend into the surrounding terrain (FEIR Mitigation Measure #5).

- Pipelines shall be wrapped with green or light brownish taping to also blend in with surrounding terrain. It should be determined which color is appropriate depending on the adjacent shrubbery. Taping on pipelines shall continue to be maintained during operation to prevent reflections and glaring off of the pipelines. (In some areas of existing developments the taping has worn off and extreme glaring is experienced off of the silvery-metal of the pipelines) (FEIR Mitigation Measure #6).

- Transmission towers shall also be etched and colored so as not to create glare conditions and to blend into the surrounding environment (FEIR Mitigation Measure #7).

- Vegetation plans and vegetation maintenance plans shall be required and approved prior to construction to minimize, reduce, or eliminate impacts from construction activity or drilling operations. In particular, these plans shall address cut and fill work required for construction of pads, roads, and related plant facilities and the revegetation of these areas. The vegetation maintenance plan shall focus on the permit holder being responsible for planting and maintaining native trees and vegetation along the revegetated areas (FEIR Mitigation Measure #8).

- Lighting plans shall be approved prior to construction and shall include that lighting be shielded or directed away from any sensitive receptors including residences, public roadways and any other public use facilities (FEIR Mitigation Measure #9).

- Cut and fill areas shall be revegetated to reduce visual contrast with the surrounding area (FEIR Mitigation Measure #10).

- In Lake County, new high voltage transmission facilities shall not be sited along a foreground view of major resorts or wineries, potential state and country scenic highways or communities as designated in the Lake County General Plan, unless no feasible alternatives exist. In situations where no feasible alternatives exist, undergrounding or other visual mitigation measures shall be imposed (FEIR Mitigation Measure #).

AESTHETICS: Operations and Maintenance

Impact: Potentially significant adverse visual modifications to the landscape may occur.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

Impacts from operation and maintenance of facilities will be the same as those for listed above for lease development with the exception of the construction activity (except for additional well drilling). Night lighting for structures, well pads, access road entrances, and other areas may create pinpoints of light as well as the potential for illumination from steam and foggy conditions.
These changes have the potential to result in a significant visual impact which is dependent on viewer sensitivity, proximity and relative scale.

Mitigation measures adopted for the Non-Drilling Exploration and Exploratory Drilling phases of the project shall continue to be implemented during the Operations and Maintenance phase, thereby reducing any potentially significant adverse aesthetic impacts to insignificant levels.

AESTHETICS: Abandonment

Impact: Removal of geothermal materials will leave visual scars such former facility and drill pads, and abandoned roadways. modifications to the landscape may occur.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

During actual abandonment, it is assumed that all power plant building structures, pipelines, unused transmission towers and construction debris and surplus materials will be removed from

the sites. Once these materials are removed, visual scars will consist of the areas used for drilling pads, plant and ancillary facility pads (i.e., maintenance buildings), and roadways.

If site restoration occurs in accordance with proper revegetation guidelines, including recontouring of pads to blend in with the existing terrain, then any potential impacts resulting from operations activities and subsequent abandonment will be substantially reduced. In addition, the following mitigation measures relating to specific revegetation requirements shall be implemented to help reduce post-abandonment aesthetic impacts to insignificant levels:

- o Vegetation plans addressing abandonment should also be approved in advance of any final project approvals and should be in accordance with requirements addressed for biological resources (FEIR Mitigation Measure #12).

- o Cut and fill areas will be revegetated to reduce visual contrast with the surrounding area (FEIR Mitigation Measure #13).

AESTHETICS: Cumulative Impacts

Impact: Land use conversion necessary for the construction of access roads, well sites, and power plants has the potential to significantly impact scenic quality in the project area.

Finding: A) Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

B) Such changes or alterations are within the responsibility or jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by other such agencies or can or should be adopted by other such agencies (Lake, Sonoma, and Mendocino Counties).

Facts Supporting the Finding:

Expansion of geothermal development, could include 4 to 8 new plants, and will have the potential to change to character of the viewshed in the project area. Changes in a viewshed could include the addition of incongruous features such as industrial structures, grading cuts, vegetation removal, and increased human activity and traffic flow.

The combination of new plants and new residential growth will have the potential to begin to change the character of the area from rural and remote to one of slightly more development. It is unlikely however, that the overall character will change significantly due to other constraints in land development, most notably infrastructure availability.

Siting considerations shall include use of hills and terrain to naturally screen elements from general viewsheds, sensitive placement of man-made structures, use of compatible coloration,

restoration of landform and vegetation, and respect for scenic corridor viewsheds. Though it will not be possible to completely mitigate cumulative visual impacts, mitigation will reduce the impact to acceptable levels.

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
SYSTEMS SAFETY				
Phase 1 - Non-Drilling Exploration Activities				
The proposed leasehold is generally undeveloped with the exception of some roadways.	Offroad vehicle operation increases possibility of fires. Any wildland brush or forest fire would constitute a significant impact.	All vehicles shall be equipped with CDF-approved spark arrestors. Campfires and smoking shall be prohibited during exploratory activities.	- Applicant/ Developer	Reduced to insignificant
Phase 2 - Exploratory Drilling				
No active geothermal activities occur in any of the three project areas.	Potential exists for blowout of well. A blowout could constitute a significant impact because of the possibility of injury or death to site personnel.	Blowout Prevention Equipment shall be installed in all wells.	- Applicant/ Developer	Reduced to insignificant
Phase 3- Full Field Development				
The proposed leasehold is generally undeveloped with the exception of some roadways.	During construction, potential exists to start a significant brush or forest fire. Any wildland brush or forest fire would constitute a significant impact.	All vehicles shall be equipped with CDF-approved spark arrestors. Development areas shall be cleared of combustible material and a fire extinguisher shall be kept on-site at all times.	- Applicant/ Developer - CDF	Reduced to insignificant
Phase 4- Operation and Maintenance				
No active geothermal activities occur in any of the three project areas. Roadways are used for transportation of hazardous material such as fuel, solvents, and drilling muds.	Accidents may occur during maintenance, esp. welding-initiated fires. Accidents may occur with the handling of hazardous materials and hazardous wastes. Waste haulers must typically use heavy trucks and negotiate steep, narrow, or winding roads to transport wastes from remote well site and geothermal facilities. The impacts associated with hazardous materials and wastes depends on the volume generated.	Development areas shall be cleared of combustible material and a fire extinguisher shall be kept on-site at all times. Hazardous wastes shall be packaged, manifested and transported according to applicable state and federal regulations. A safety and emergency response program shall be developed including regular vehicle inspections by Applicant in accordance to OSHA regulations. On-site minimization of hazardous wastes shall be employed to maximum extent possible.	- Applicant/ Developer - CDF - Applicant/ Developer - Planning Dept. - CDHS - OSHA - SLC	Reduced to insignificant The potential for accidental release or improper disposal of hazardous wastes is considered a significant adverse impact.

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Impacts and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 5 - Abandonment				
The proposed leasehold is generally undeveloped with the exception of some roadways.	Abandonment activities will involve much work similar to construction, e.g., welding and potential exists to start a fire. Hazardous wastes may accumulate as equipment, pumps, sumps, etc. are dismantled.	Development areas shall be cleared of combustible material and a fire extinguisher shall be kept on-site at all times. A reclamation plan shall be submitted to Planning Department and well abandonment shall occur as required by the Division of Oil and Gas and SLC.	• Applicant/ Developer • Applicant/ Developer • DOG • SLC	Insignificant
Cumulative Impacts and Mitigations				
	Increase in incidence of wildland brush or forest fire. Increase amount of hazardous gases. Generation of significant quantities of known hazardous wastes which must be contained, handled, and disposed of in accordance with state and federal law.	All vehicles shall be equipped with CDF-approved spark arrestors. Development area shall be cleared of combustible material and a fire extinguisher shall be kept on-site at all times. It is recommended that geothermal waste facilities be located in the Geysers area. Technological changes in operations has great potential to reduce hazardous waste disposal requirements. A Risk Management and Prevention Program for acutely hazardous materials shall be prepared as required by State law.	• Applicant/ Developer • Applicant/ Developer • DOG • SLC	Reduced to insignificant The potential for accidental release or improper disposal of hazardous wastes is considered a significant adverse impact.
LAND USE				
Phase 1 - Non-Drilling Exploration Activities				
The Geysers-Calistoga KGRA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	No land use disturbance will result from non-drilling exploration activity.	No mitigation is required.	• Applicant/ Developer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 2 - Exploratory Drilling				
The Geysers-Calistoga KORA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	Land transformation will occur as a result of access roadway construction and pad development.	Development shall proceed in accordance with all state and local permit requirements. Measures to minimize land disturbance to be implemented include limitation on cut and fill activity, sharing of roadways, etc. All disturbed areas will be revegetated as soon as possible.	- Applicant/ Developer	Reduced to insignificant
Phase 3 - Full Field Development				
The Geysers-Calistoga KORA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	Land transformation will occur as a result of access roadway construction and pad development.	Development shall proceed in accordance with all state and local permit requirements. Measures to minimize land disturbance to be implemented include limitation on cut and fill activity, sharing of roadways, etc. All disturbed areas will be revegetated as soon as possible.	- Applicant/ Developer	Reduced to insignificant
Phase 4 - Operation and Maintenance				
The Geysers-Calistoga KORA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	Land transformation will occur as a result of access roadway construction and pad development.	Measures to mitigate potential impacts to residential users include adherence to buffering requirements set forth through county guidelines for noise, visual effects, air quality, and other areas.	- Applicant/ Developer	Reduced to insignificant
Phase 5 - Abandonment				
The Geysers-Calistoga KORA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	Proper site restoration and revegetation and time will allow areas to recover from development scars.	Revegetation plan shall be developed by a qualified biologist, reviewed by Planning and monitored to ensure revegetation is successful.	- Applicant/ Developer	Reduced to insignificant
Cumulative Impacts and Mitigations				
The Geysers-Calistoga KORA is rural in character and sparsely populated due mainly to the characteristic steepness and ruggedness of the terrain, fire hazard potential, road accessibility, and lack of public services.	Potential land use conflict would probably occur in the northern part of Lake County in Project Area 2. This area is where development is likely to occur and is near inhabited areas.	The mitigation measures described above will reduce all of the significant adverse impacts regarding land use to levels considered acceptable and therefore insignificant.	- Applicant/ Developer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
PHYSIOGRAPHY AND GEOLOGY				
Phase 1 - Non Drilling Exploration Activities				
The area of the Geysers KORA is located in the physiographic province known as the Coast ranges. The physical setting for the project leasing area is the very steep, rugged terrain surrounding the Mayacmas Mountains.	Gravity surveys, magnetometer surveys, seismic surveys, resistivity surveys, aerial photo and geophysical reconnaissance, drilling of shallow heat gradient well, geochemical studies, geologic mapping, and field surveys may occur but impacts are minimal.	A plan of exploration shall be prepared and submitted prior to commencement of any exploration activities.	- Applicant/ Developer - DOG - SLC	Reduced to Insignificant
Phase 2 - Exploratory Drilling				
The area of the Geysers KORA is located in the physiographic province known as the Coast ranges. The physical setting for the project leasing area is the very steep, rugged terrain surrounding the Mayacmas Mountains.	Impacts from exploratory drilling include erosion from grading, damage from spills of lubricating oils and greases, damage from accidental discharge of drilling fluids, overflow of fluids in sump pit, and uncontrolled blowouts. Most of the above activities could cause hazardous materials to be discharged.	Exploratory drilling plan shall include measures to minimize listed impacts. Pads shall be compacted to a minimum of 90 percent relative compaction, filled slope banks should not exceed a gradient of 1.5:1, toes of fills should be stabilized with rock and gravel or keyed into stable soil, etc.	- Applicant/ Developer	Reduced to Insignificant
Phase 3 - Full Field Development				
The area of the Geysers KORA is located in the physiographic province known as the Coast ranges. The physical setting for the project leasing area is the very steep, rugged terrain surrounding the Mayacmas Mountains.	Impacts from development include erosion from grading, damage from spills of lubricating oils and greases, damage from accidental discharge of drilling fluids, overflow of fluids in sump pit, and uncontrolled blowouts. Most of the above activities could cause hazardous materials to be discharged. Impact is multiplied by the number of wells drilled. Varied impacts will also occur from construction of a steam gathering system and transmission facilities.	Drilling plan shall include measures to minimize listed impacts. Pads shall be compacted to a minimum of 90 percent relative compaction; filled slope banks should not exceed a gradient of 1.5:1, toes of fills should be stabilized with rock and gravel or keyed into stable soil, etc.	- Applicant/ Developer	Reduced to Insignificant
Phase 4 - Operation and Maintenance				
The area of the Geysers KORA is located in the physiographic province known as the Coast ranges. The physical setting for the project leasing area is the very steep, rugged terrain surrounding the Mayacmas Mountains.	Little additional surface disturbance will occur. Impacts are limited to possible occurrences ranging from failure of previous work to regional geotechnical or resource events. Possible but unlikely impacts include damaging settlements and/or failure of the earthwork, and failure or leakage of surface pits constructed.	A maintenance plan shall be developed by Applicant and reviewed by Planning. Maintenance activities shall occur on a regular basis.	- Applicant/ Developer - Planning Department	Reduced to Insignificant
...surface rupture				
There are five large faults and numerous smaller fractures mapped in the area of the leases. They are considered very old and inactive.	It is believed to be improbable that a surface rupture would occur as a result of an active fault.	No mitigation measures are proposed.		Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
b. seismic activity				
There are five large faults and numerous smaller fractures mapped in the area of the leases. They are considered very old and inactive. No linear arrangements of clustering of epicenters occurs in the lease areas.	Potential future fault movement is low, but because of the numerous faults in California, periodic ground shaking is likely.	Proper engineering design should eliminate the impact of earthquake induced damage to the physical facilities.	- Applicant/ Developer	Reduced to insignificant
c. landslides				
Over 200 landslides have been identified in the project areas but only a few could be classified as being active. The majority of the area is currently very stable.	During the course of operational life, a landslide is probable, however, the impact of these slides can be made negligible with proper planning and location of operation and facilities. Addition of large volumes of fluids into the surrounding soils could trigger landslides.	No pad construction shall occur on steep slopes, at the base of toe of steep slopes, or known slides. All fills should be properly drained. Updated mapping of existing and potential landslide areas shall occur and these areas shall be avoided.	- Applicant/ Developer	Reduced to insignificant
d. liquefaction				
Bedrock of Project Lease Areas No. 1 and 2 is composed of Jurassic to Cretaceous age rocks of the Franciscan Complex. The bedrock geology in Project Lease Area No. 3 is composed of volcanic flows and air-borne volcanics such as ash, etc.	Sands and gravel of the alluvial and colluvial deposits, landslide debris, terrace deposits, and some lake deposits all have potential for liquefaction. These type of deposits have a somewhat restricted distribution over the lease area.	If these deposits are avoided, it is improbable that any damages could result.	- Applicant/ Developer	Reduced to insignificant
e. flooding				
Rainfall is highly variable in the lease area. Most of the drainages are very narrow and incised.	Probability of flooding in the stream valleys is high.	Avoidance of building in these water courses will make flooding improbable.	- Applicant/ Developer	Reduced to insignificant
f. cavity collapse				
Review of maps and aerial photos do not indicate any evidence of natural cavities or underground workings in the lease area.	It is improbable that cavity collapse would occur in the area.	No mitigations measures are suggested.		Insignificant
g. volcanism				
There are known active volcanoes in the area. The closest potential area in about 24 km (15 miles) away in the area north of Lower Lake.	The potential for surface lava flows reaching the area and doing damage is considered extremely remote. The major impact from eruption would be ash fall.	No mitigation measures are suggested.		Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Geothermal Resource Utilization				
Resource Depletion Without injection, a model indicates that within 15 years, at the current rate of production the reservoir (excluding isolated unproven resource cells) would be depleted.	A negative impact of increased geothermal development of new fields is the increased rate of depletion.	Conservation of the resource during energy production is the most effective mitigation.	- Applicant/ Developer	Significant
		Operational measures such as cycling, lead following, and puffing conserve the resource by delivering loads in a cyclic manner consistent with demand.	- Applicant/ Developer	
		Binary recovery equipment installment would increase overall plant efficiency.	- Applicant/ Developer	
	The depletion of use of an operator's underlying field at the expense of an adjacent operator is a very difficult impact to assess.	Mitigation measures cannot be presented until further knowledge is developed about the mechanics (i.e., exchange of heat and fluids) between the cells in the reservoir.		
Reservoir Injection The same model as mentioned above, indicates that by reinjecting 30 percent of the mass produced, energy recovery would increase by 35 percent.	A negative impact from injection is local quenching of the formation and/or thermal breakthrough of the injectate into the zone where the production well takes up steam. Quenching causes the steam drawn off to be too wet and reduces the efficiency of power generation.	Mitigation measures to prevent debilitation of the resource would be left as a self imposed requirement for the operator.	- Applicant/ Developer	Insignificant
	The construction of impoundments on any of the local water courses to be used for injection would have substantial impacts.	Mitigation would be imposed through the county flood control permitting process.	- Applicant/ Developer	Significant
	Operator could also be employing recharge or reservoir stimulation activities which may debilitate the production in an adjacent field.	Mitigation would be imposed through application of water quality standards set by county on injectate.	- Applicant/ Developer	Insignificant
Induced Ground Displacement A secondary impact of drawing off the resource is surface displacement caused by relief of subsurface pressure. The settlement may then induce seismicity.	Localized settlement in the mountainous Geysers area may have minor impacts on roadways and utilities and accelerate top soil creep on steep slopes.	Subsidence and induced seismic activities are mitigatible by recharging the reservoir by injection. Localized displacement has little impact and requires little mitigation.	- Applicant/ Developer	Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Induced Seismicity Micro earthquake activity in the Geysers area has been directly attributed to the withdrawal of steam for energy production. Landform Modification The area of the Geysers KORA is located in the physiographic province known as the Coast ranges. The physical setting for the project leasing area is the very steep, rugged terrain surrounding the Mayacmas Mountains.	Current seismicity is of low magnitude and has unmeasurable effects on the production facilities. However, tremors propagating through the neighboring communities are a nuisance causing resident concern. Physical results of landform modification, i.e., increased erosion and sedimentation. These occur on a site-specific basis and it is not expected that these separate impacts would be coincidental and cause relative cumulative impacts.	A sustained monitoring program is needed to measure vertical and horizontal displacements in order to assess the seismic risks in the region, and further research on reservoir is needed. No geotechnical engineering measures nor protective measures, in addition to those identified for site-specific impacts, can be prescribed for application on a cumulative basis.	• Applicant/ Developer	Insignificant
Phase 3 - Abandonment				
	Impacts are similar to those during development phase. Topography will be altered, drainage and water run off patterns will be modified and abandonment activities will expose bare ground which will result in increased erosion.	Site shall be cleared of all unnecessary materials and restored insofar as practical. Sumps and test ponds shall be filled and covered. Erosion control measures shall be in place. Sump fluids shall be chemically analyzed for hazardous materials, biologically sensitive materials, and heavy metal and solids.	• Applicant/ Developer	Reduced to Insignificant
Cumulative Impacts and Mitigations				
Geothermal Resource Utilization Currently, no active geothermal activities occur in the project area but facilities do presently exist over known steam fields.	The cumulative impact is an overall decline in geothermal resource potential in the Geysers which is presently theorized to be accelerated due to lack of injection of sufficient quantities of fluids to effect depletion.	Implementation of area-wide injection is the only mitigation to conserve the resource. However, because of the lack of sufficient source of water, this measure is considered to have low feasibility.	• Applicant/ Developer	Reduced to insignificant with the implementation of a feasible injection program
SURFACE AND GROUND WATER HYDROLOGY				
Phase 1 - Non-Drilling Exploration Activities				
The Geysers region is surficially typified by steep canyons, high ridges, erodible soil, thin alluvial fill, light, heavy rains, and high runoff. The study area encompasses portions of four watershed basins.	Some significant short-term impacts are increased erosion and sedimentation problems in nearby streams. Sedimentation and turbidity affect fish and wildlife habitats and can endanger water supplies.	Plans of exploration shall detail methods to prevent erosion into creeks and streams. Many impacts on the surface water can be reduced or eliminated by proper planning and siting.	• Applicant/ Developer • DOG	Reduced to Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 2 - Exploratory Drilling				
The Geysers region is surficially typified by steep canyons, high ridges, erodible soil, thin alluvial fillings, heavy rains, and high runoff. The study area encompasses portions of four watershed areas.	Construction activities will cause impacts that will be more short-term in nature rather than permanent. Significant impacts include removal of vegetation, increased sediment load in streams, and increased fines in lakes, etc. The greatest potential problem is the spillage of drilling muds or fluids which could create significant adverse water quality conditions deleterious to most aquatic organisms.	Measures to reduce erosion and sedimentation include damming cut and fill areas with hay bales, compacting pads to a minimum of 90 percent compaction, and finding slope banks no more than a gradient of 1.5:1. Sumps shall be properly lined and monitored. Sumps shall always maintain at least 3 feet of freeboard to accommodate blow out, excess formation fluids or heavy rains and proper berms and dikes shall be strategically placed to guard against spills.	- Applicant/ Developer	Reduced to insignificant
Phase 3 - Full Field Development				
Development of a lease into production status involves drilling additional wells, building a generation plant, constructing pipelines, feeder transmission lines, and providing required access.	Impacts of development are the same as exploratory drilling as listed above except the magnitude of potential construction projects is much greater which increases the potential or frequency of impacts.	Mitigations are the same for as for the exploratory phase listed above. Additional mitigations include - Applicant shall obtain by right or purchase all water used in drilling process or dust control. Springs shall be monitored and floodplain management practices shall be implemented.	- Applicant/ Developer	Reduced to insignificant
Phase 4 - Operation and Maintenance				
The Geysers region is surficially typified by steep canyons, high ridges, erodible soil, thin alluvial fillings, heavy rains, and high runoff. The study area encompasses portions of four watershed areas.	The development of water resources on area streams would be a significant adverse impact. An important significant impact is the potential of contamination of surface water via liquid wastes. Cooling tower drift emissions may enter local streams under times of excess rainfall causing potentially significant water quality impacts. The extent of degradation from spills depends on the composition and quantity of the spill.	Applicant shall obtain by right or purchase all water used in drilling process or dust control. All waste must be disposed of in compliance with existing federal state and county regulations. No waste shall be allowed to enter any streams, creek or other body of water. Sumps shall be properly lined and monitored. Sumps shall always maintain at least 3 feet of freeboard to accommodate blow out, excess formation fluids or heavy rains and proper berms and dikes shall be strategically placed to guard against spills.	- Applicant/ Developer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Groundwater Impacts				
There is no significant development of groundwater in the immediate area of the leases. The lease areas in general are not to be considered as having a high potential for developing significant amounts of groundwater.	Potential for significant impact to the limited groundwater resources during drilling and operation phases may occur from accidental seepage of drilling or other stored fluids, spillage of oils, etc, and migration of formation fluids up and into the groundwater zones as a result of faulty cement jobs and completion practices..	Primary protection of the groundwater is to be accomplished by proper lining of all sumps and monitoring same on a monthly basis.	- Applicant/ Developer	Reduced to insignificant
Phase 3- Abandonment				
The Geysers region is surficially typified by steep canyons, high ridges, erodible soil, thin alluvial fillings, heavy rains, and high runoff. The study area encompasses portions of four watershed areas.	The impacts to the lease area from abandonment will be similar to impacts listed above for exploratory drilling. The impacts will be transitory in nature and very short lived.	Mitigations are similar to those listed above under exploratory drilling. Additional mitigation includes the removal of all unnecessary material, the filling and covering of test ponds, and the restoration of the premises to a near natural state.	- Applicant/ Developer	Reduced to insignificant
Cumulative Impacts and Mitigations				
	The potential for significant hydrologic impacts is high for a short duration during and shortly after construction of future geothermal development sites.	Applicants shall implement above listed mitigation and participate in an area-wide monitoring program.	- Applicant/ Developer	Reduced to insignificant
	Any significant diversion of surface water for reservoir injection would significantly diminish water quality and aquatic habitats.	The implementation of an areawide reservoir injection program would require a corresponding program to develop local surface and/or groundwater sources to support injection. Advance in technology could produce greater steam efficiency and greater condensate for injection.	- Applicant/ Developer	Reduced to insignificant with the implementation of a feasible injection program
	Watershed values and water quality can be significantly affected from alteration of natural runoff patterns.			
	The potential exists for spills of hazardous waste material.	All waste must be disposed of in compliance with existing federal state and county regulations. No waste shall be allowed to enter any streams, creeks, or other body of water.	- Applicant/ Developer	The potential for accidental release or improper disposal of hazardous wastes is considered a significant adverse impact.

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
BIOLOGICAL RESOURCES				
Phase 1 - Non-Drilling Exploratory Activities				
Vegetation				
The project region is a highly diverse mosaic of shrub, woodland, riparian, and grassland communities. Of particular importance for rare plant species is the presence of serpentine soils and rocky outcrops within the project area.	Removal of vegetation for access and trampling of localized areas by workers will impact area. Potentially significant impacts occur if habitat contains or is suitable for rare plant species. Probability of significant impacts is higher for Project Areas 2 and 3 where sensitive plant species are known to occur.	A site-specific plant survey and rare plant survey shall be conducted by a qualified biologist in accordance with California Native Plant Society guidelines as recommended by the California Department of Fish and Game.	- Applicant/ Developer - CNPS - CDFG	Reduced to insignificant
Wildlife				
The high diversity of vegetation communities present in the leasehold areas is associated with a high diversity of wildlife taxa. The areas are actually or potentially occupied by 33 species of amphibians and reptiles, 97 species of birds as residents or seasonal visitors, and 34 species of mammals.	The overall impacts are minimal on wildlife for all three properties. Habitat will not be significantly altered and activities are of short duration as not to produce a harmful disruption of wildlife activities.	A survey shall be conducted by a qualified wildlife biologist to assure no active carnivore dens are present. If an occupied den is found, wildlife biologist shall insure protection of occupant and may relocate the den if necessary.	- Applicant/ Developer	Reduced to insignificant
Aquatic Resources				
There are two major drainage systems within the project area, and several major creeks which drain into Big Sulphur Creek.	Impacts could result if these activities increased sedimentation into the streams.	Measures to prevent erosion and sedimentation shall be included in the plan of exploration.	- Applicant/ Developer - DOG	Reduced to insignificant
Phase 2 - Exploratory Drilling				
Vegetation				
The project region is a highly diverse mosaic of shrub, woodland, riparian, and grassland communities. Of particular importance for rare plant species is the presence of serpentine soils and rocky outcrops within the project area.	Removal of vegetation and potential for removal of sensitive species during access road construction, road widening, clearing of the drilling pad site, disposal of soil or debris, and construction of the drilling pad sump. Accidental spillage of hot fluids may also damage vegetation on a local basis. Project Area 2 and 3 have the highest probability of significant individual and cumulative impacts from drilling operations.	Removal of or injury to sensitive plant species shall be avoided. If removal of injury to sensitive plant population occurs, a management plan shall be developed and implemented immediately. Mitigation measures to prevent spills are listed under all phases of Surface Water and Groundwater Hydrology section.	- Applicant/ Developer - Applicant/ Developer	Reduced to insignificant Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Wildlife				
The high diversity of vegetation communities present in the leasehold areas is associated with a high diversity of wildlife taxa. The areas are actually or potentially occupied by 33 species of amphibians and reptiles, 97 species of birds as residents or seasonal visitors, and 34 species of mammals.	Considerable local modification of wildlife habitat and habitat removal will result, especially during drilling pad and sump construction. Impact will be greatest in Project Area 3 where yellow pine forests would be removed. Important den sites for larger carnivores may be lost. Wildlife activities may increase substantially in the area since the drilling sump will potentially increase the amount of available water.	A survey shall be conducted by a qualified wildlife biologist to evaluate habitats and assure no active carnivore dens are present. If an occupied den is found, wildlife biologist shall insure protection of occupant and may relocate the den if necessary.	• Applicant/ Developer • Potentially beneficial	Reduced to insignificant
Aquatic Resources				
There are two major drainage systems within the project area, and several major creeks which drain into Big Sulphur Creek.	Construction activities would have potential to cause increased sedimentation and erosion into creek drainages. There is a chance for potentially toxic materials to be spilled and eventually be washed into the streams.	Cut and fills shall be dammed with sandbags during construction to prevent sediment transport. Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any streams, creeks, or other body of water.	• Applicant/ Developer • Applicant/ Developer	Reduced to insignificant Reduced to insignificant
Phase 3 - Full Field Development				
Vegetation				
The project region is a highly diverse mosaic of shrub, woodland, riparian, and grassland communities. Of particular importance for rare plant species is the presence of serpentine soils and rocky outcrops within the project area.	Approximately 45 to 90 hectares (100 to 200 acres) of vegetation would be cleared for each power plant site. Vegetation may be injured from accidental spills or other gaseous emissions. Removal of vegetation in a sensitive habitat such as serpentine grassland would be considered highly significant.	A revegetation and landscaping plan shall be developed which utilizes native plant species. Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any streams, creek or other body of water. Areas of sensitive habitat shall be avoided.	• Applicant/ Developer • Applicant/ Developer • Applicant/ Developer	Reduced to insignificant Reduced to insignificant Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Wildlife				
The high diversity of vegetation communities present in the leasehold areas is associated with a high diversity of wildlife taxa. The areas are actually or potentially occupied by 33 species of amphibians and reptiles, 97 species of birds as residents or seasonal visitors, and 34 species of mammals.	Considerable local modification of wildlife habitat will result, especially during drilling pad and sump construction. Impact will be greatest in Project Area 3 where yellow pine forests would be removed. Important den sites for larger carnivores may be lost. More secretive or disturbance-sensitive species such as gray foxes may be permanently displaced by development activities. Fossorial mammals and reptiles will be displaced or [illegible].	A survey shall be conducted by a qualified wildlife biologist to evaluate habitats and to assure no active carnivore dens are present. If an occupied den is found, wildlife biologist shall insure protection of occupant and may relocate the den if necessary.	- Applicant/ Developer	Reduced to Insignificant
Aquatic Resources				
There are two major drainage systems within the project area, and several major creeks which drain into Big Sulphur Creek.	Construction activities have potential to significantly increase sedimentation and erosion into creek drainages. Potentially toxic materials may be spilled and eventually be washed into the streams and cause lethal or sublethal effects on aquatic organisms.	Cut and fills shall be dammed with sandbags during construction to prevent sediment transport. Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any streams, creeks, or other body of water.	- Applicant/ Developer - Applicant/ Developer	Reduced to Insignificant Reduced to Insignificant
Phase 4 - Operation and Maintenance				
Vegetation				
The project region is a highly diverse mosaic of shrub, woodland, riparian, and grassland communities. Of particular importance for rare plant species is the presence of serpentine soils and rocky outcrops within the project area.	Impacts during operation and maintenance are not expected beyond those previously discussed. Steam emissions and accidental spills are potential impacts.	Measures as discussed previously will reduce chances for spills.	- Applicant/ Developer	Insignificant Reduced to Insignificant
Wildlife				
The high diversity of vegetation communities present in the leasehold areas is associated with a high diversity of wildlife taxa. The areas are actually or potentially occupied by 33 species of amphibians and reptiles, 97 species of birds as residents or seasonal visitors, and 34 species of mammals.	The continued operation of the steam plant facilities will not impact additional habitat beyond that lost in development.			Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Aquatic Resources				
There are two major drainage systems within the project area, and several major creeks which drain into Big Sulphur Creek.	This phase would have less potential for major inputs of sediment since construction will have been completed; however, reconstruction and maintenance may increase erosion in the streams. Accidental spills and steam emissions are also a potential significant impact.	Cut and fills shall be dammed with sandbags during construction to prevent sediment transport. Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any streams, creeks, or other body of water.	- Applicant/ Developer - Applicant/ Developer	Reduced to insignificant Reduced to insignificant
Phase 5 - Abandonment				
Vegetation				
The project region is a highly diverse mosaic of shrub, woodland, riparian, and grassland communities. Of particular importance for rare plant species is the presence of serpentine soils and rocky outcrops within the project area.	Impacts include contamination and mortality of the surrounding vegetation due to migration of toxic fluids.	Measures as discussed previously will reduce chances for spills and seepage of toxic materials.	- Applicant/ Developer	Reduced to insignificant
Wildlife				
The high diversity of vegetation communities present in the leasehold areas is associated with a high diversity of wildlife taxa. The areas are actually or potentially occupied by 33 species of amphibians and reptiles, 97 species of birds as residents or seasonal visitors, and 34 species of mammals.	Re-establishment of wildlife in the area of an abandoned well will depend partly on the patterns of revegetation.	A revegetation plan shall be developed which utilizes native plant species and encourages wildlife uses.	- Applicant/ Developer	Reduced to insignificant
Aquatic Resources				
There are two major drainage systems within the project area, and several major creeks which drain into Big Sulphur Creek.	Activities associated with well abandonment has the potential to accelerate sedimentation into streams. Toxic fluids left in the area could wash into the streams.	Cut and fills shall be dammed with sandbags during abandonment to prevent sediment transport. Measures as discussed previously will reduce chances for spills and seepage of toxic materials.	- Applicant/ Developer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Cumulative Impacts and Mitigations - Vegetation and Wildlife				
	Removal of additional acreages of habitat within The Geysers area would be a significant cumulative impact on plant communities and wildlife habitat in general. Cumulative impacts would occur on sensitive species particularly serpentine chaparral, old-growth yellow pine woodland, and riparian communities. Development would result in a potentially significant cumulative loss of foraging habitat for raptors.	Siting consideration for cumulative projects should take into account biological habitats. Implementation of above listed mitigation measures would reduce significant adverse impacts to levels considered acceptable and therefore insignificant.	• Applicant/ Developer	Reduced to insignificant
Cumulative Impacts - Aquatic Resources				
	The cumulative effects of siltation, input of toxic chemicals either from operation or from accident, and from lowering of water levels in the streams and interruption of creek flow.	Strict adherence to the site-specific mitigation measures proposed to control siltation, accidents, and inputs of toxic chemicals will help to insure that cumulative impact in the Geysers area on aquatic resources are insignificant.	• Applicant/ Developer	Reduced to insignificant
CULTURAL RESOURCES AND PALEONTOLOGY				
Cultural Resources				
Phase 1 - Non-Drilling Exploration Activities				
Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects.	Some off-road and foot disturbance is probable. Potential damage to cultural resources is possible during the placement of instruments used in anomalous surface heat flow studies and resistivity surveys.	No mitigation measures are suggested. No mitigation measures are suggested.		Insignificant Insignificant
Phase 2 - Exploratory Drilling				
Substantial and important cultural and paleontologic resources exist the Geysers area as demonstrated by previous projects.	Road widening and cutting/filling activities will further disturb known sites which have already been impacted by existing roads and trails. Drill pad and sump construction will disturb relatively large amounts of land making significant cultural resources impacts highly probable.	Sites of possible cultural interest will be avoided through redesign of facilities. Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause redirection of grading or construction activities until a determination of importance is made by monitor. It is recommended that further survey occur on a site-specific basis.	• Applicant/ Developer • Applicant/ Developer • Applicant/ Developer	Reduced to insignificant To be determined at time of survey To be determined at time of survey

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 3 - Full Field Development				
Substantial and important cultural and paleontologic resources exist the Geysers area as demonstrated by previous projects.	If development utilizes existing pads and access, anticipated impacts are similar but on a much smaller scale than for that of exploration. As most prehistoric sites are small, feasibility in the placement of pipeline systems and power transmission towers should allow site avoidance.	Sites of possible cultural interest will be avoided through redesign of facilities. Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause redirection of grading or construction activities until a determination of importance is made by monitor. It is recommended that further survey occur on a site-specific basis.	- Applicant/ Developer - Applicant/ Developer - Applicant/ Developer	Reduced to insignificant To be determined at time of survey To be determined at time of survey
Phase 4 - Operation and Maintenance				
Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects.	Significant adverse impacts to cultural resources could occur with any new construction during this phase. Landform modification associated with geothermal development may cause an increase in slope instability and erosion resulting in potential impact to cultural resources.	Sites of possible cultural interest will be avoided through redesign of facilities. Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause redirection of grading or construction activities until a determination of importance is made by monitor. It is recommended that further survey occur on a site-specific basis.	- Applicant/ Developer - Applicant/ Developer - Applicant/ Developer	Reduced to insignificant To be determined at time of survey To be determined at time of survey
Phase 5 - Abandonment				
Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects.		Abandonment activity should be restricted to the originally disturbed area to avoid potential impacts to cultural resources.	- Applicant/ Developer	Reduced to insignificant
Paleontologic Resources				
Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects.	Any ground disturbance could result in significant impact to fossil resources.	A qualified paleontologist shall be retained to monitor and assess sensitive fossil resources.	- Applicant/ Developer	Reduced to insignificant
Cumulative Impacts and Mitigation				
Substantial and important cultural and paleontologic resources exist in The Geysers area as demonstrated by previous projects.	Undoubtedly, areas to be developed under the cumulative scenario will contain cultural resources which may be inadvertently, adversely affected.	Field studies of potential project sites and monitoring exploration and grading shall minimize impacts.	- Applicant/ Developer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
TRANSPORTATION				
Phase 1 - Non-Drilling Exploration Activities				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	No significant impacts on transportation will occur since traffic generation during this phase of development is minimal.	Measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	• Applicant/ Developer	Insignificant
Phase 2 - Exploratory Drilling				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	Heavy vehicle and employee traffic (50 to 60 trips per day) occurs during the 6 to 12 month exploratory drilling phase. Though the traffic generation is not necessarily significant, the heavy trucks and equipment will cause significant damage to County roadways not designated to handle such loads.	Road construction and improvement should occur prior to the start of exploratory drilling. Other measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	• Applicant/ Developer • Applicant/ Developer	Reduced to insignificant Reduced to insignificant
Phase 3 - Full Field Development				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	The greatest increases in traffic will occur during the initial development phase although these additional levels will be temporary in nature. From 80 to 100 trips per day are generated over the 24 to 36 month typical well field development period for a power plant.	Road construction and improvement should occur prior to the start of exploratory drilling. Other measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	• Applicant/ Developer • Applicant/ Developer	Reduced to insignificant Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 4 - Operations and Maintenance				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	Work trips can be expected to diminish from the peak construction phases. Typically there are 30 to 50 trips per day over the life of any one geothermal power plant and well field development project.	Road construction and improvement should occur prior to the start of exploratory drilling. Employee car pools or a commuter bus system shall be established. A traffic safety plan shall be developed by the Applicant.	- Applicant/ Developer - Applicant/ Developer - Applicant/ Developer	Reduced to insignificant
<u>Impacts of Roadways</u> Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	Roadway deterioration will incrementally increase as a result of the transport of heavy trucks and equipment. Significant traffic increases are not anticipated to occur along the principal state highways in the region, although slow-moving trucks may constitute a traffic hazard. Specifically, geothermal activity in Project Areas 1 and 2 will create a potential nuisance and driving hazard on Cloverdale-Geyser Road.	Road construction and improvement should occur prior to the start of exploratory drilling. Other measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	- Applicant/ Developer - Applicant/ Developer	Reduced to insignificant
<u>Impact of Transport of Hazardous Wastes</u> Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	As a percentage of total traffic volume, these are expected to remain about the same as existing levels through the end of the century. Since the total amount of traffic will increase, the percentage of the traffic transporting hazardous material is expected to decline.	Measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	- Applicant/ Developer	Reduced to insignificant
Phase 5 - Abandonment				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	It is expected that trip generation would be about 30 trips per day over a 3 month abandonment procedure. Impacts would be less than exploratory drilling impacts.	Roads may be retained for other beneficial uses provided that effective erosion control measures have been implemented.	- Applicant/ Developer	Beneficial

Table S- · IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Cumulative Impacts and Mitigations				
Traffic circulates through the study area on a network of state, county, and privately-owned roads. Most of these are built and maintained to carry relatively small amounts of traffic consistent with the area's rural character.	Cumulative development will generate additional heavy truck traffic in the study area, with the associated significant impact on roadway maintenance and highway safety. The occurrence of large, slow moving trucks on winding, mountain roads represents a significant safety hazard to other motorists.	Implementation of above listed mitigation measures would reduce significant adverse impacts to levels considered acceptable and therefore insignificant.	• Applicant/ Developer	Reduced to insignificant
AIR QUALITY				
Phase 1 - Non-Drilling Exploration Activities				
The air quality of an area depends on the temporal and special distribution of local emissions, the volume of air into which these emissions are emitted, the transport of pollutants and the nature of the chemical, and physical transformation from emitted species. The meteorology of the proposed lease sites is characterized by significant diversity.	Emissions associated with this phase include minor or incidental use of diesel powered equipment and vehicles and dust generation. The incidental and sporadic activities will not create significant air emissions.	Compliance with local county air pollution control rules and regulations, reductive equipment operation and dust control will ensure impacts remain insignificant.	• Applicant/ Developer • County Air Pollution Control	Reduced to insignificant
Phase 2 - Exploratory Drilling				
The air quality of an area depends on the temporal and special distribution of local emissions, the volume of air into which these emissions are emitted, the transport of pollutants and the nature of the chemical, and physical transformation from emitted species. The meteorology of the proposed lease sites is characterized by significant diversity.	Air pollutants will result from the diesel powered drilling equipment and from truck and passenger vehicles commuting to the drill site. Small numbers of vehicles dispersed throughout the area do not pose any threat to healthful levels of air quality. Fugitive dust causes transitory and localized impacts. Regional particulate load levels will not be significantly affected. Local impacts may retard plant growth and dust plumes along the ridgeline may create objectionable visible impacts. Well bleeds, another source of emissions, can create a significant air quality impact if a large number emit H2S which is then carried downwind to receptors.	Compliance with local county air pollution control rules and regulations, reductive equipment operation and dust control will ensure impacts remain insignificant. Fugitive dust generation should be minimized by enforcing reasonable driving speeds on dirt roads, by using water or oil spray to control dusty area, and by performing major grading activities in spring when natural soil moisture is high. The best available control technologies and/or state of the art technology shall be implemented to insure H2S emissions are below air pollution control standards.	• Applicant/ Developer • County Air Pollution Control • Applicant/ Developer • Applicant/ Developer	Reduced to insignificant Reduced to insignificant Potential of accidental release of a large amount of H2S though unlikely, could be significant adverse impact

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 3 - Full Field Development				
Approximately 80 percent of the steam entering the power plant is ultimately lost to the atmosphere through evaporation in the cooling towers.	Impacts for full field development will be the same as those listed under Exploratory Drilling. Impacts will incrementally increase depending on the number of wells developed.	Mitigations include those listed under Exploratory Drilling above.	- Applicant/ Developer	Reduced to insignificant
Phase 4 - Operation and Maintenance				
The air quality of an area depends on the temporal and special distribution of local emissions, the volume of air into which these emissions are emitted, the transport of pollutants and the nature of the chemical, and physical transformation from emitted species. The meteorology of the proposed lease sites is characterized by significant diversity.	Redrilling and drilling of new make-up wells would be similar to the emissions discussed above. The major air quality concern is the release of combined stream flow from a number of wells at the power plant. Plant location and prevailing air flows have a dominant effect on dispersion patterns.	Mitigation measures include those listed under Exploratory Drilling above. Facilities shall be monitored and maintained throughout operation. Any new facility shall not contribute H2S concentrations such that the sum plus the background concentration exceeds the hourly standard.	- Applicant/ Developer - Applicant/ Developer	Reduced to insignificant Potential of accidental release of a large amount of H2S though unlikely, could be significant adverse impact
Phase 5 - Abandonment				
The meteorology of the proposed lease sites is characterized by significant diversity.	Combustion emissions and fugitive dust are the primary effects associated with abandonment but effects will be insignificant.	Fugitive dust generation should be minimized by enforcing reasonable driving speeds on dirt roads, by using water or oil spray to control dusty area, and by performing major grading activities in spring when natural soil moisture is high.	- Applicant/ Developer	Reduced to insignificant
Cumulative Impacts and Mitigations				
	Increased emissions from various vehicular and geothermal sources will occur. Of most concern is the increase in emission of hydrogen sulfide. On a cumulative basis, the impact from all existing facilities in addition to those which could conceivably be built is considered significant.	Implementation of above listed mitigation measures would reduce significant adverse impacts to levels considered acceptable and therefore insignificant except for the effect on population from the unlikely event of accidental release of a large amount of H2S emissions.	- Applicant/ Developer	Reduced to insignificant except for the unlikely event of the release of large amounts of H2S
ACOUSTICAL ENVIRONMENT				
Phase 1 - Non-Drilling Exploration Activities				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	Of surveys conducted during this phase, only a seismic survey may cause noise impacts but these impacts will not be significant.	Seismic surveys shall not be located closer than 366 meters (1,200 feet) from existing residences or other sensitive receptors.	- Applicant/ Developer - Noise Control Officer	Reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 2 - Exploratory Drilling				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	Acoustical impacts occur during well pad installation, materials delivery, drilling and well installation, and access road installation. Of these, well and pad installation are likely to have the most impacts.	Noise standards shall be met between the hours of 7:00 A.M. and 10:00 P.M. Noise levels from drilling operations shall be muffled. Distance restrictions shall be in effect around sensitive receptors.	• Applicant/ Developer • Noise Control Officer	Reduced to Insignificant
Phase 3 - Full Field Development				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	Noise sources during development include large diesel powered equipment for construction. These activities will occur mostly during the day.	Noise standards shall be met between the hours of 7:00 A.M. and 10:00 P.M. Noise levels from drilling operations shall be muffled. Distance restrictions shall be in effect around sensitive receptors. Wells and power plants shall be placed where produced noise will be atmospherically attenuated.	• Applicant/ Developer • Noise Control Officer	Reduced to Insignificant
Phase 4 - Operations and Maintenance				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	Plant operations are expected to generate a noise level of approximately 76 to 77 dBA at 15 meters (50 feet). Additional noise will come from employees commuting to work.	Noise standards shall be met between the hours of 7:00 A.M. and 10:00 P.M. Noise levels from drilling operations shall be muffled. Distance restrictions shall be in effect around sensitive receptors. Wells and power plants shall be placed where produced noise will be atmospherically attenuated. Car pooling programs shall be encouraged.	• Applicant/ Developer • Noise Control Officer	Reduced to Insignificant
Phase 5 - Abandonment				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	Impacts during this phase are not continuous, typically performed during the day and are considered insignificant.	No mitigation measures are required.		Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Cumulative Impacts and Mitigations				
Ambient noise levels range from 30 to 45 dBA, but may rise by more than 10 dBA above these levels due to natural phenomena such as wind and rain. Sporadic manmade noises also occur within or adjacent to the leases.	The cumulative effect in the region would be an increase in ambient noise levels. The magnitude of the increase is dependent upon site-specific conditions; however, such noise levels would be substantially above that of similar, non-industrial areas in the region..	The monitoring and implementation of the above listed mitigations will reduce any significant adverse impacts to acceptable levels therefore insignificant.	• Applicant/ Developer • Noise Control Officer	Reduced to insignificant
SOCIOECONOMICS AND PUBLIC SERVICES				
Demographics and Housing				
All counties in the study have experienced substantial growth in the past 10 to 15 years. Some county plans contain expectations of continued growth from geothermal development; however, with a decline in steam reservoir temperatures, the level of geothermal development may have already peaked. The housing stock in Lake County, mainly single-family units, has risen in the last 10 years.	Activities are expected to be supported by the indigenous geothermal workers in the area. Development is not expected to create a significant adverse impact. Cumulative impacts include short-term demands for construction workers and housing and a small number of permanent geothermal workers. It is expected this level of growth could be accommodated without significant socioeconomic effect.	No significant impacts on population and housing were identified, therefore, no mitigation measures are provided.		Insignificant
Employment				
Lake County economy is based primarily on retail sales and services and government employment. Sonoma County is in transition form an economy heavily dependent on agriculture, construction, and resources to more urban center employment. The economy of Mendocino County is based primarily on agriculture, government, services, manufacturing, and tourism.	Employment generated by all phases of development is not anticipated to have significant impacts on the total labor supply in the county.	No significant impact on employment were identified, therefore, no mitigation measures are provided.		Insignificant
Fiscal Effects				
Geothermal development has had a substantial fiscal impact on Lake and Sonoma County and other local government entities. It is expected that geothermal revenues will continue to fluctuate due to oil price cycles and resource decline.	Cumulative projects will generate direct revenues to the counties within which such operations are developed. A generally positive effect on the fiscal resources of the involved county agencies is expected.	Fees shall be paid to appropriate State and county agencies.	• Applicant/ Developer	Beneficial

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Fire and Police Protection and Medical Service				
Fire A vulnerable wildland fire hazard area. The Geysers is served by both state and local fire fighting services with emergency service provided by the city's fire departments and in the unincorporated areas by contract agreement with the California Department of Forestry (CDF). **Police** Sonoma, Lake, and Mendocino County each maintain their own Sheriff's Department to provide protective services to the unincorporated portions of their respective counties. The CHP provides policing of traffic to unincorporated areas of Lake and Sonoma Counties. **Medical** Emergency medical services in The Geysers area are provided by private and county hospitals located in the larger urban areas.	A potential need for emergency services from fire and police protection and medical agencies may be generated by the increased human activity and operation of vehicles, but significant adverse impacts are not anticipated.	**Fire** Fire safety guidelines shall be provided by the CDF. Additional personnel will be provided as necessary. Emergency response and evacuation plans shall be developed. **Police** The use of private security forces shall be considered. A unified emergency notification plan shall be developed.	• Applicant/ Developer • CDF • Applicant/ Developer • CHP	Reduced to insignificant Reduced to insignificant
Water				
The principal source of water for urban and agricultural purposes in the region is groundwater. Surface water sources provide limited supplies of useable potable water.	Due to limited water resources, additional water demand from geothermal operations can result in adverse impacts to the current water resources. If adequate volumes of water are not present on-site, water demand will result in a significant adverse impact. There is also potential to over-use surface waters.	Assurance for the provision of adequate water and sewer service is required prior to development. Applicant shall obtain by right or purchase all water used. Permits shall be obtained for withdrawal and diversion of water from surface streams. Areas with insufficient water resources should consider importing water from local suppliers.	• Applicant/ Developer • Applicant/ Developer • Applicant/ Developer • Applicant/ Developer	Upon securing a reliable water source, impacts will be reduced to insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Wastewater				
Within the project area, central wastewater collection and treatment systems have been developed only in the larger communities. The balance of the area, including geothermal development, relies on individual septic systems to dispose of domestic and commercial sewage. Currently there are no known major impacts on area water quality due to reliance of on-site wastewater disposal practices. However, there is concern for the long-term maintenance of local water quality in the planning area.	Additional wastewater generated by the development and operation of geothermal facilities is considered an adverse, but not significant impact. Current wastewater disposal practices including collection and treatment systems and on-site systems will be sufficient to handle the additional wastewater.	Sanitary and hand washing facilities should be provided at each drill site. Assurance for the provision of adequate water and sewer service is required prior to development.	• Applicant/ Developer • Applicant/ Developer	Reduced to Insignificant
Solid Waste				
No solid waste is being produced from the project areas currently, but substantial volumes of waste will be are generated during all phases of geothermal resource development.	Volumes of solid waste generated during drilling, field development, and operation will be an adverse impact. Landfills and hazardous waste management units will be incrementally impacted.	Applicant shall implement County Solid Waste Management Plans which include programs to reduce the quantities of non-hazardous solid waste being sent to landfills.	• Applicant/ Developer	Reduced to Insignificant
Energy Utilities				
The planning area's energy needs are met by electricity provided by PG&E, and by bottled propane gas and fuel oil supplied by several local distributors. Natural gas is not available.	Construction operations will expend substantial amounts of energy and is considered a short-term adverse impact. Energy consumption itself represents a loss of nonrenewable resources but increased demand will be serviced by local companies and is not a significant impact to current service levels.	Facilities will be designed for optimum energy efficiency in accordance with the California Energy Commission standards.	• Applicant/ Developer • CEC	Reduced to Insignificant
Schools				
Schools districts within Lake County near the project area include Kelseyville Unified School District, Konocti Unified School District and Middletown Unified School District. Each district serves kindergarten through high school.	The increase in students and the need for additional classroom space will result in a significant adverse impact to school services since the majority of schools are already operating over capacity.	Developers shall pay required state impact fees to mitigate school impacts resulting from geothermal-related development.	• Applicant/ Developer	Reduced to Insignificant
Cumulative Impacts and Mitigations				
	The increase in demand for public services associated with geothermal development is likely to be insignificant. Each project must be assessed for its individual effect.	Implementation of above mitigation measures as well as additional mitigations prescribed on a site-specific basis shall reduce any significant impacts to an acceptable level and therefore insignificant.	• Applicant/ Developer	Reduced to Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
AESTHETICS				
Phase 1 - Non-Drilling Exploration Activities				
Visual elements within and adjacent to the project area are composed of natural elements of land, water, and vegetation with man-made forms including pipeline, pads, plants, and facilities interspersed within the natural setting.	No visual impacts will result from this phase.	No mitigation measures are required.		Insignificant
Phase 2 - Exploratory Drilling				
Visual elements within and adjacent to the project area are composed of natural elements of land, water, and vegetation with man-made forms including pipeline, pads, plants, and facilities interspersed within the natural setting.	Visual modifications include changes in form line and texture of the area, introduction of a visually obtrusive element (drill rig), changes of the landscape to that of partially developed, and possible changes in viewer expectations. These changes have the potential to result in a significant visual impact depending on viewer sensitivity, proximity, and relative scale from the drilling activity. (Impacts are not expected in Project Area 2 but may be experienced elsewhere for views of Areas 1 and 3.)	Pad, roads, pipelines, plants, and transmission facilities should be designed so as to present the least visual intrusion on views from popular use areas. The use of local rock types for road and pad surfacing material will help minimize color contrast between engineered and natural land forms.	- Applicant/ Developer	Reduced to Insignificant
Phase 3 - Full Field Development				
Visual elements within and adjacent to the project area are composed of natural elements of land, water, and vegetation with man-made forms including pipeline, pads, plants, and facilities interspersed within the natural setting.	More activity will be visible during construction than at any other time. Impacts are the same as listed above, plus changes in lighting and potential for glaring and additional visually obtrusive elements such as road cut and power plants. These changes have the potential to result in a significant visual impact depending on viewer sensitivity, proximity, and relative scale from the drilling activity. (Impacts are not expected in Project Area 2 but may be experienced elsewhere for views of Areas 1 and 3.)	Pad, roads, pipelines, plants, and transmission facilities should be designed so as to present the least visual intrusion on views from popular use areas. The use of local rock types for road and pad surfacing material will help minimize color contrast between engineered and natural land forms. On visual edges such as ridgelines, construction of facilities should maintain a low profile design. Plants, buildings, and other structures should be constructed and colored in natural colors. Cut and fill areas shall be revegetated.	- Applicant/ Developer	Reduced to Insignificant

Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
Phase 4 - Operations and Maintenance				
Visual elements within and adjacent to the project area are composed of natural elements of land, water, and vegetation with man-made forms including pipeline, pads, plants, and facilities interspersed within the natural setting.	Cooling towers emit saline drift droplets and warm vapor that condense into large visible plumes which may cause an aesthetic impact. Night lighting for structures, well pads, access road entrances, and other areas may create pinpoints of light as well as the potential for illumination from steam and foggy conditions. (Visual elements of this phase are similar to lease development exempting the construction activity. Significant visual impacts depend on viewer sensitivity, proximity, and relative scale from the drilling activity. Impacts are not expected in Project Area 2 but may be experienced elsewhere for views of Areas 1 and 3.)	On visual edges such as ridgelines, construction of facilities should maintain a low profile design. Pad, roads, pipelines, plants, and transmission facilities should be designed so as to present the least visual intrusion on views from popular use areas. The use of local rock types for road and pad surfacing material will help minimize color contrast between engineered and natural land forms. Plants, buildings, and other structures should be constructed and colored in natural colors. Cut and fill areas shall be revegetated.	- Applicant/ Developer	Reduced to Insignificant
Phase 5 - Abandonment				
Visual elements within and adjacent to the project area are composed of natural elements of land, water, and vegetation with man-made forms including pipeline, pads, plants and facilities interspersed within the natural setting.	Once materials are removed, visual scars will consist of the areas used for drilling pads, plant, and ancillary facility pads and roadways. Site restoration with revegetation and recontouring will substantially reduce impacts. (The level of impact reduction depends on distance of viewer to site and the relative scale of the site within the entire viewshed.)	Revegetation plans addressing abandonment should be approved in advance of final project approvals. Cut and fill areas will be revegetated to reduce visual contrast with the surrounding area.	- Applicant/ Developer - Applicant/ Developer	Reduced to Insignificant
Cumulative Impacts and Mitigations				
	If development is concentrated in areas that can be seen by large portions of the general public, a significant impact will result. Particularly pertinent viewsheds would be from Highway 175 and the communities in the area. It is unlikely the overall character will change significantly due to other constraints in land development.	Cumulative mitigation measures include the monitoring and implementation of all measures previously listed. No effective mitigation is available to completely mitigate all impact, but significant adverse impacts will be reduced to a level considered acceptable and therefore insignificant.		Reduced to Insignificant

EXHIBIT E

STATEMENT OF OVERRIDING CONSIDERATIONS

The California State Lands Commission adopts this Statement of Overriding Considerations with respect to the impacts identified in the Final EIR which cannot be reduced, with mitigation, to a level of insignificance or which are nonmitigable, specifically those associated with:

- accidental release of hazardous materials during Exploratory Drilling, Field Development, and Operation and Maintenance,
- accidental release or improper disposal of hazardous wastes during Exploratory Drilling, Field Development, and Operation and Maintenance,
- use of surface water sources to support resource conservation through reservoir injections,
- impacts related to the geothermal resource extraction such as induced seismicity and ground subsidence,
- the complex nature of zonal encroachment making feasible mitigation unknown, the uncertainties of the availability of sufficient fluids which is a major factor affecting conservation of the steam resource at The Geysers, and,
- hazardous H_2S emissions from a well blowout or other uncontrolled situation are not mitigable.

The Commission hereby finds that the Geothermal Leasing Program (Program) will have numerous benefits to the State of California (State) and to and within the project areas where geothermal projects may be undertaken.

The Program will generate non-tax revenues to the State of California. The proposed negotiated lease provides that a ten percent (10%) royalty will be paid to the State. Such percentage is to be applied to the gross revenue, as defined in the lease, that will be generated if lease development occurs. This revenue will accrue to the State Teachers' Retirement System (STRS).

Subsequent geothermal development within the project areas would have direct positive impact on the local tax base of local counties from the increase in assessed valuation due to construction of improvements necessary to geothermal production. The overall effect of these tax revenues, though not representing a substantial additional source of revenue, will slow the decline of geothermal revenues currently experienced in Lake and Sonoma Counties.

Geothermal development results in substantial generation of sales taxes associated with the goods and services consumed in the local area. An additional positive and substantial source of revenue associated with geothermal development is the sales, income, and property taxes paid by the permanent geothermal work force and the payroll spending which supports the local economy.

The direct costs attributed to geothermal development are the county and local agency expenditures for processing permits, administration, and environmental review of the specific projects. However, these costs are generally offset by filing and permit fees. Property tax revenues from geothermal facilities more than make up the difference in the cost of administration and general county services required by geothermal development. Local government processing costs are small in comparison to revenues generated to such governments.

In addition, the counties have used special agreements with geothermal developers to provide specific finding to mitigate project impacts. It is expected that such agreements will continue to be used as a means of compensating any public costs associated with geothermal development.

Other positive effects result from geothermal development. Geothermal energy provides an alternative to the use of fossil fuels to generate electricity and to provide heating of space and water. Continued development of technology to use both high and low temperature geothermal resources will contribute a partial alternative to combustion of hydrocarbon fuels for power production. Development of alternative energy sources has become increasingly important in the State to lessen reliance on hydrocarbon-based resources and the extraction of geothermal resources on State lands is an integral part of energy projections for California.

The proposed leasing action will have positive impact on efforts to manage The Geysers resource. Present data suggests that the resource is not renewable, and that commercial productivity over the long-term is dependent on a coordinated management approach, that is, incorporation of water injection and operational resource conservation procedures. The State Lands Commission participates on the TAC of the Interim Coordinated Resources Management Plan effort and supports its collective direction regarding management of The Geysers resource. The mitigation measures which are proposed in the EIR provide a standard for other permitting agencies which approve geothermal development projects. Thus, the State Lands Commission leasing action, through its support of resource management plans, policies and model mitigation measures, will contribute to the long-term productivity of The Geysers and will also minimize short-term impacts created from geothermal development.

The Commission further finds that all mitigation measures identified in the EIR have been imposed to avoid or lessen impacts, to the maximum extent possible, and furthermore finds that the No Project Alternative, Leasing of Portions of the Project Areas, Prohibiting Construction of Power Plants, Alternative Land Use, and Alternative Technologies are infeasible because they: 1) only partially offset significant environmental impacts; 2) do not provide the benefits described; 3) do not fully fulfill the objectives of the proposed project; or 4) are socially, economically, or technically infeasible.

Based on the above discussion, the Commission finds that the benefits of the proposed Program outweigh the unavoidable adverse environmental effects and considers such effects acceptable.