MINUTE ITEM
This calendar item No. C30
was approved as minute item
No. 30 by the State Lands
Commission by a vote of 3
to 0 at its 6-30-92
meeting.

CALENDAR ITEM

C30

A 2, 8

S 2, 4

06/30/92
W 40571
Willard

CERTIFICATION OF FINAL EIR FOR PROPOSED GEOTHERMAL DEVELOPMENT FOR CERTAIN STATE LANDS WITHIN THE GEYSERS AREA, LAKE, MENDOCINO AND SONOMA COUNTIES

AREA, TYPE OF LAND, AND LOCATION:
Approximately 6,230 acres of reserved mineral interests and fee land primarily in the northwestern portion of the Geysers Geothermal Steam Field, Lake, Mendocino and Sonoma counties (Exhibit "A").

LAND USE:
The State has reserved mineral rights in excess of 15,000 acres within the Geysers Geothermal Steam Field Area, which includes portions of Lake, Mendocino and Sonoma counties. The State has currently 5970 acres under geothermal lease in the Geysers area. The reserved mineral interest lands (and in certain cases fee parcels) are a portion of the "school lands" which the State received as a grant from the Federal Government in 1853 to support public schools. Revenue received from the use of school lands is for the benefit of the State Teachers Retirement System (STRS). Further leasing must occur if idle parcels are to be brought into production. However, California law (CEQA, Section 21100 et. seq. P.R.C.) requires that the Commission shall have considered the environmental impacts which could result from leasing of lands for geothermal exploration and development.

ENVIRONMENTAL REVIEW:
As Lead Agency, the Commission, acting through its staff, determined that an Environmental Impact Report (EIR) was required for the proposed leasing program and subsequent development activities. The EIR was prepared using the tiering concept of a Master EIR, with post-leasing activities to be subject to supplemental environmental studies as required by CEQA.

A draft EIR (SCH 90030208) was prepared by the consulting firm of Chambers Group, Inc. and copies were circulated for review and

comment to Responsible and Trustee agencies, and the public. As part of this public review process, the Commission's staff held a public hearing on December 4, 1991 in Lakeport, for the sole purpose of receiving comments on the draft EIR. This meeting was attended by local government representatives, the Sierra Club and members of the public. A finalizing addendum, responding to all comments received on the draft EIR, was prepared and constitutes, in conjunction with the draft, the Final EIR for geothermal leasing of certain lands within The Geysers Geothermal Steam Field Area. The Final EIR was mailed to all the individuals, groups and government agencies that received and commented on the draft EIR.

The leasing action, in and of itself, will not result in any direct impact on the environment. Subsequent geothermal development will have impact on the environment and the EIR is an analysis of the potential impacts. Because no specific development has been proposed the impact analysis represents reasonable worst-case estimates of probable effects without being specific to a project site. Such future site specific projects will be subject to subsequent environmental impact analyses and reports; it should be noted that the Commission may not be the Lead Agency for the subsequent exploration and development projects.

The major areas analyzed include systems safety, land use, geology and physiography, surface water and ground water hydrology, biological resources, cultural resources, transportation, air quality, acoustical environment, socioeconomic and public services and aesthetics. A summary of the specific and cumulative impacts and proposed mitigation for each resource category is described in Exhibit "B". Because the EIR concludes that the "no project" is the environmentally superior alternative, the document also contains an environmentally superior alternative (elimination of the Cobb Mountain area from leasing) from the other alternatives in compliance with the CEQA Guidelines.

The inclusion of the environmentally superior alternative should not be interpreted to mean that it is preferred by any agency, including the Commission, the consultant or individual. It is

included in order to conform to the CEQA Guidelines. Section 15121 of the Guidelines states in part:

> "(b) While the information in the EIR does not control the agency's ultimate discretion or the project, the agency must respond to each significant effect identified in the EIR by making findings under Section 15091 and if necessary by making a statement of overriding consideration under Section 15093."

EXHIBITS:

A. Location Map.
B. Summary of Impacts.

IT IS RECOMMENDED THAT THE COMMISSION:

1. DETERMINE THAT A FINAL EIR FOR PROPOSED GEOTHERMAL DEVELOPMENT FOR CERTAIN STATE LANDS WITHIN THE GEYSERS AREA LAKE, MENDOCINO AND SONOMA COUNTIES HAS BEEN PREPARED FOR PROPOSED ACTION BY THE COMMISSION, FOLLOWING EVALUATION OF COMMENTS AND CONSULTATION WITH PUBLIC AGENCIES HAVING JURISDICTION BY LAW, INCLUDING ALL RESPONSIBLE AND TRUSTEE AGENCIES.

2. DETERMINE THAT THE COMMISSION HAS REVIEWED AND CONSIDERED THE FINAL EIR, SCH. NO. 90030208.

3. CERTIFY THAT A FINAL EIR, SCH. NO. 90030208, HAS BEEN COMPLETED IN ACCORDANCE WITH CEQA, THE STATE'S EIR GUIDELINES AND THE COMMISSION'S ADMINISTRATIVE REGULATIONS.

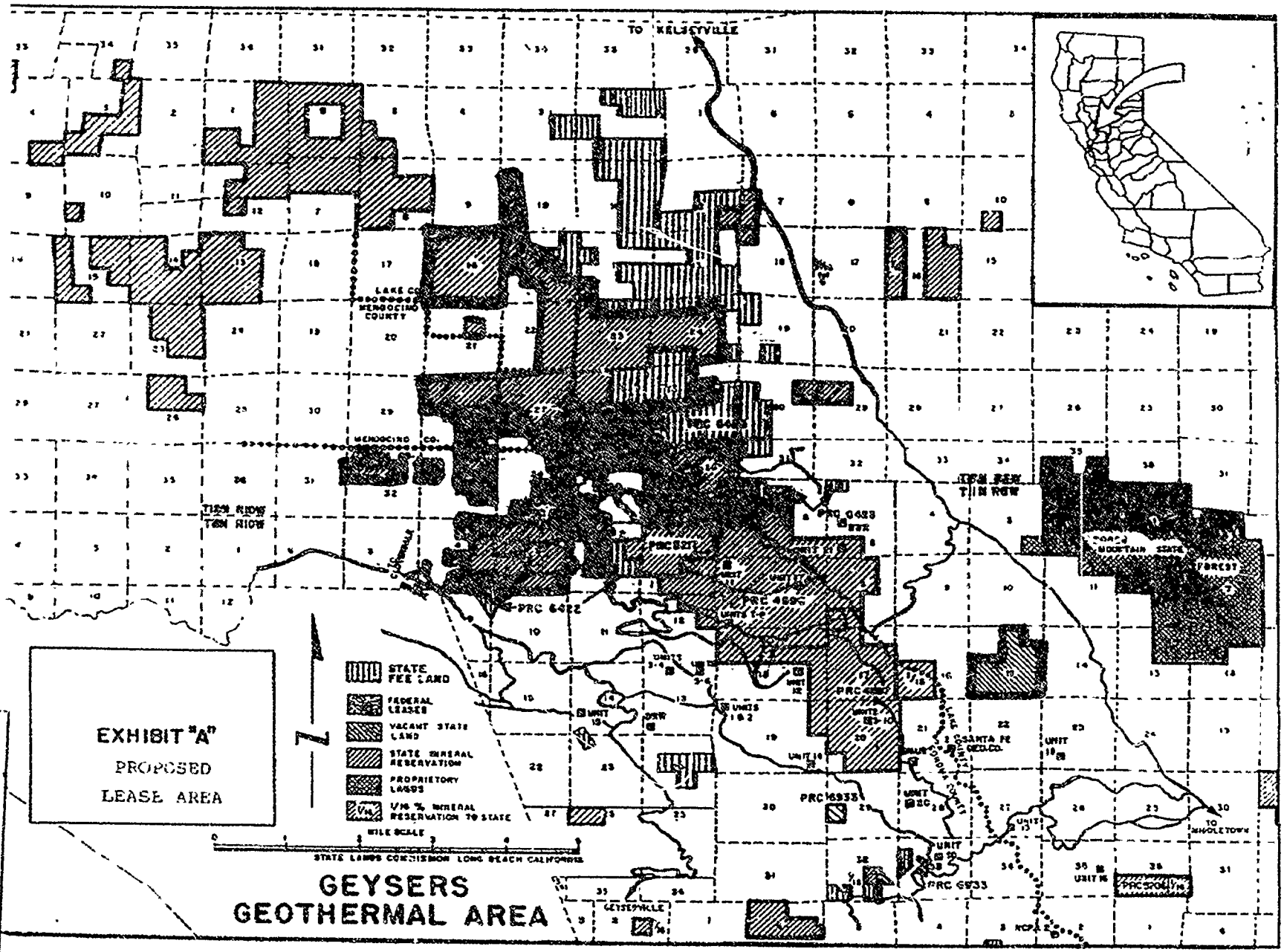

EXHIBIT "A"
PROPOSED
LEASE AREA

GEYSERS
GEOTHERMAL AREA

CALENDAR PAGE 442
MINUTE PAGE [illegible]

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.

EXHIBIT B

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

Existing Conditions	Issues 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.	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.	- Applicant/ Developer	Reduced to insignificant
	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.	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 - DOG - SLC	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 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.	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 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.	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 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.	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 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.	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 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.	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 KGRA 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 KGRA 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, culverts, drainage ditches and adequate energy dissipators at transition to natural drainage channels should be installed as necessary, 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 KGRA 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, culverts, drainage ditches and adequate energy dissipators at transition to natural drainage channels should be installed as necessary, 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 KGRA 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
a. 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
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 area 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
g. volcanoes				
There are known active volcanoes in the area. The closest potential area is 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
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 reservoir 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, load following, and puffing (shut down and then recycling) conserve the resource by delivering loads in a cyclic manner consistent with demand. In that each resource is somewhat unique, each of these measures would need to be reviewed in depth prior to large scale implementation.	- 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 other 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.	Geothermal development occurring on SLC leasing areas shall be conducted in a manner that is consistent with the Interim Coordinated Resource Management Plan.	- Applicant/ Developer	Reduced to 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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 topsoil 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
Induced Seismicity Micro earthquake activity in the Geysers area has been directly attributed to the withdrawal of steam for energy production.	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 residents concern.	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.	- Applicant/ Developer	Insignificant
Landform Modification The area of the Geysers KGRA 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.	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.	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.		
Phase 5 - 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 acids.	- 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 offset depletion.	Implementation of area-wide injection is one method of conserving the resource. A project is under consideration which would transport Lake County treated effluent to the southeast Geysers for injection purposes. The feasibility of such measures is the subject of continued study.	- Applicant/ Developer	Significant

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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 fillings, heavy rains, and high runoff. The study area encompasses portions of four watershed areas.	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
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 installing culverts, drainage ditches and adequate energy dissipators at transitions to natural drainage channels. 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 - 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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 stream, 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
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 5- 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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.	- Applicants' 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.
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.	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
	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.			
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

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.	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
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 53 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 forest 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 assess 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

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.	Construction activities would have potential to cause increased sedimentation and erosion into Squaw Creek and other drainages.	Cut and fills shall be dressed with sandbags during construction to prevent sediment transport.	- Applicant/ Developer	Reduced to insignificant
	There is a chance for potentially toxic materials to be spilled and eventually be washed into the streams.	Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any stream, creek, or other body of water.	- Applicant/ Developer	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.	A revegetation and landscaping plan shall be developed which utilizes native plant species.	- Applicant/ Developer	Reduced to insignificant
	Vegetation may be injured from accidental spills or other gaseous emissions.	Measures as discussed previously will reduce chances for spills. No waste shall be allowed to enter any stream, creek or other body of water.	- Applicant/ Developer	Reduced to insignificant
	Removal of vegetation in a sensitive habitat such as serpentine grassland would be considered highly significant.	Areas of sensitive habitat shall be avoided.	- 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.	Considerable local modification of wildlife habitat will result, especially during drilling pad and sump construction.	A survey shall be conducted by a qualified wildlife biologist to evaluate habitats and to assess no active eagle 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
	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 sensitive or disturbance-sensitive species such as gray foxes may be permanently displaced by development activities.			
	Fossorial mammals and reptiles will be displaced or killed.			

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.	Construction activities have potential to significantly increase sedimentation and erosion into Squaw Creek and other drainages.	Cut and fills shall be dammed with sandbags during construction to prevent sediment transport.	- Applicant/ Developer	Reduced to insignificant
	Potentially toxic materials may be spilled and eventually be washed into the streams and cause lethal or sublethal effects on aquatic organisms.	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	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.			Insignificant
	Steam emissions and accidental spills are potential impacts.	Measures as discussed previously will reduce chances for spills.	- 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.	The continued operation of the steam plant facilities will not impact additional habitat beyond that lost in development.			Insignificant
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.	Cut and fills shall be dammed with sandbags during construction to prevent sediment transport.	- Applicant/ Developer	Reduced to insignificant
	Accidental spills and steam emissions are also a potential significant impact.	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	Reduced to insignificant

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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 Sulpher 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 damaged 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
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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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.	No mitigation measures are suggested.		Insignificant
	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.		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.	Sites of possible cultural interest will be avoided through redesign of facilities.	- Applicant/ Developer	Reduced to insignificant
	Drill pad and sump construction will disturb relatively large amounts of land making significant cultural resources impacts highly probable.	Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause cessation of grading or construction activities until a determination of importance is made by monitor.	- Applicant/ Developer	Reduced to insignificant
		It is recommended that further survey occur on a site-specific basis.	- Applicant/ Developer	Reduced to insignificant
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.	Sites of possible cultural interest will be avoided through redesign of facilities.	- Applicant/ Developer	Reduced to insignificant
	As most prehistoric sites are small, flexibility in the placement of pipeline systems and power transmission towers should allow site avoidance.	Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause cessation of grading or construction activities until a determination of importance is made by monitor.	- Applicant/ Developer	Reduced to insignificant
		It is recommended that further survey occur on a site-specific basis.	- 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 - 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.	Sites of possible cultural interest will be avoided through redesign of facilities.	- Applicant/ Developer	Reduced to insignificant
	Landform modification associated with geothermal development may cause an increase in slope instability and erosion resulting in potential impact to cultural resources.	Construction activities shall be monitored by qualified individuals. Buried resources discovered will cause relocation of grading or construction activities until a determination of importance is made by monitor.	- Applicant/ Developer	Reduced to insignificant
		It is recommended that further survey occur on a site-specific basis.	- Applicant/ Developer	Reduced to insignificant
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
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

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

Existing Conditions	Issues and Impacts	Mitigation	Responsible for Mitigation	Residual Impact
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. A transportation permit from Caltrans is required for all loads on state highways which exceed established limits as to width, height, and weight.	- Applicant/ Developer - 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.	- Applicant/ Developer	Reduced to insignificant
		Employee car pools or a commuter bus system shall be established.	- Applicant/ Developer	
		A traffic safety plan shall be developed by the Applicant.	- Applicant/ Developer	
Impacts of Roadways				
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.	Road construction and improvement should occur prior to the start of exploratory drilling.	- Applicant/ Developer	Reduced to insignificant
	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.	Other measures to assist in safety include use of warning vehicles, trips scheduled around peak hours, and the encouragement of car pooling.	Applicant/ Developer	
	Specifically, geothermal activity in Project Areas 1 and 2 will create a potential nuisance and driving hazard on Cloverdale-Geyser Road.			
Impact of Transport of Hazardous Wastes				
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-1 - 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 spacial 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. An additional concern is the possibility of disturbance of serpentine soils which may contain unhealthful levels of asbestos.	Compliance with local APCD rules and regulations, reductive equipment operation and dust control will ensure impacts remain insignificant. This includes consideration for asbestos hazard from disturbance of serpentine soils.	- Applicant/ Developer - County Air Pollution Control	Reduced to insignificant
Phase 2 - Exploratory Drilling				
The air quality of an area depends on the temporal and spacial 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.	Compliance with local APCD rules and regulations, reductive equipment operation and dust control will ensure impacts remain insignificant. This includes consideration for asbestos hazard from disturbance of serpentine soils.	- Applicant/ Developer - County Air Pollution Control	Reduced to insignificant
	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.	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
	Well blowds, another source of emissions, can create a significant air quality impact if a large number emit H_2S which is then carried downwind to receptors.	The best available control technologies and/or state of the art technology shall be implemented to insure H_2S emissions are below air pollution control standards.	- Applicant/ Developer	Accidents, release of a large amount of H_2S is not mitigable.
	An additional concern is the release of radon-222 which may cause adverse health effects.	Continuous monitoring of radon-222 if off-gas noncondensible treatment stream shall be instituted.	- 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 3 - Full Field Development				
Approximately 80 percent of the steam causing 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 spacial 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. An $NaOH/H_2O_2$ abatement system should be installed and ready for operation prior to initiating drilling with compressed air. Any new facility shall not contribute H_2S concentrations such that the sum plus the background concentration exceeds the hourly standard.	- Applicant/ Developer - Applicant/ Developer - Applicant/ Developer	Reduced to insignificant Accidental release of a large amount of H_2S is not mitigable.
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.	A plan of abandonment shall be prepared prior to removal of any equipment from geothermal sites. 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 - 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 H_2S emissions.	- Applicant/ Developer	Reduced to insignificant except for the unlikely event of the release of large amounts of H_2S

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
A. SOCIAL 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 365 meters (1,200 feet) from existing residences or other sensitive receptors.	- Applicant/ Developer - Noise Control Officer	Reduced to insignificant
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. Steamline construction should also consider proper location, sizing, and design to limit excessive pressure drops and resonant harmonic effects.	- 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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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
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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
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
Fire and Police Protection and Medical Services				
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 department and in the unincorporated areas by contract agreement with the California Department of Forestry (CDF)	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.	- Applicant/ Developer - CDF	Reduced to insignificant
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.		Police The use of private security forces shall be considered. A unified emergency notification plan shall be developed.	- Applicant/ Developer - CHP	Reduced to insignificant
Medical Emergency medical services in The Geysers area are provided by private and county hospitals located in the larger urban areas.				
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

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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.	- 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 condenses 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 Inter development excepting 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