WHITE ITEM
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

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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

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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

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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.

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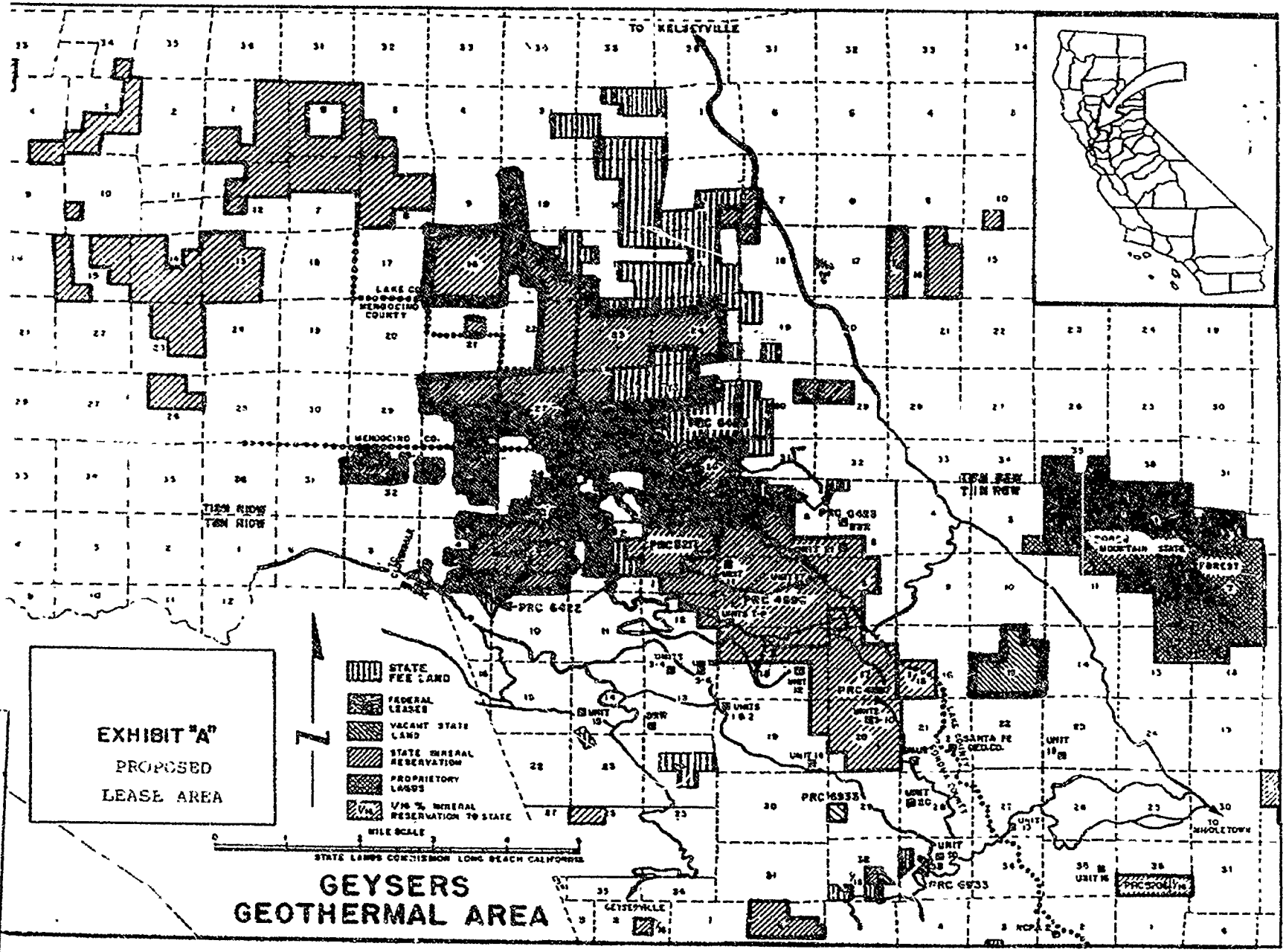

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Table S-1 - IMPACT AND MITIGATION SUMMARY - GEYSERS EIR

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

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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

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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

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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 dissipaters 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 dissipaters 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

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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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residual Impact
g. volcanics				
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 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, 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 steam 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

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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 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
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 [illegible] rugged terrain surrounding the Mayo.	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

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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

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

Existing Conditions	Issues and Impacts	Mitigations	Responsible for Mitigation	Residuals Impact
Phase 4 - Operation and Maintenance				
The Geysers region is sufficiently 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 components 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
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 escape of drilling or other stored fluids, spillage of oils, etc., and migration of formation fluids up and into the groundwater source 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 sufficiently 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 sump, ponds, and the restoration of the premises to a near natural state.	- Applicant/ Developer	Reduced to insignificant

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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. Watershed values and water quality can be significantly affected from alteration of natural runoff patterns.	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
	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. 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

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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 drainagesystems 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 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 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

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